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ERRATA.

Page	15	line	8	for	"*Akadon*"	read "*Akodon*"
,,	25	,,	23	,,	"*farjardoi*"	,, "*fajardoi*"
,,	39	,,	37	,,	"*sitiens* (*annulirostris*)"	,, "*annulirostris*"
,,	54	,,	39	,,	"*Rabditis*"	,, "*Rhabditis*"
,,	66	,,	18	,,	"*Cephenomyia*"	,, "*Cephalomyia*"
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,,	103	,,	7	,,	"*Nuttalia*"	,, "*Nuttallia*"
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,,	183	,,	15	,,	"MATHIESEN"	,, "MATTHIESEN"
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IMPERIAL BUREAU OF ENTOMOLOGY.

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DYAR (H. G.). **Notes on American** *Culex* **(Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus*, xi, no. 7–9, pp. 118–121, 3 pls. Washington, D.C., July–September 1923.

Culex (*Choeroporpa*) *mutator*, D. & K., was described from individuals bred from larvae taken in Mexico. In commenting on the structure of the male hypopygium the author could not distinguish this species from C. *leprincei*, D. & K., but it has now been found that the larvae were a mixed strain, including *C. mutator*, *C. leprincei* and *C. alfaroi* [*R.A.E.*, B, ix, 72], the latter now proving to be the male of *C. mutator*. *C.* (*Melanoconion*) *panocossa*, sp.n., is described from Panama.

BONNE-WEPSTER (J.) & BONNE (C.). **A List of Mosquitoes from Dutch Guiana (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus*, xi, no. 7–9, pp. 123–127. Washington, D.C., July-September 1923.

This list of mosquitos from Dutch Guiana comprises 135 species.

BONNE (C.). **Variability of** *Anopheles tarsimaculata* **Goeldi (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus*, xi, no. 7–9, pp. 127–128. Washington, D.C., July-September 1923.

Anopheles tarsimaculatus varies in coloration in different localities and also exhibits certain local differences in bionomics. Both this species and *A. albimanus* are found in large numbers in houses in the Panama Canal Zone, but in the interior of Surinam, though *A. tarsimaculatus* breeds in large numbers, it is hardly ever found in houses, *A. argyritarsis* having taken its place. It can, however, always be found in cowsheds, where *A. argyritarsis* is less common.

BONNE (C.). **Notes on some** *Goeldia* **Species from Surinam (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus*, xi, no. 7–9, pp. 128–129. Washington, D.C., July-September 1923.

The male of *Goeldia trichopus*, Dyar, is described. Larvae of *G. longipes*, F., have been taken in the jelly-like masses between the leaf-stalks of *Heliconia* and *Ravenala*, feeding on *Wyeomyia* (*Cleobonnea*) *occulta*, B.-W. & B. These larvae differ from those of *G. culicivora*, D. & K., which Dyar has treated as a synonym of *G. longipes*.

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KOMP (W. H. W.). **Notes on** *Culex floridanus*, **D. and K. (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus*, xi, no. 7–9, pp. 133–135, 1 pl. Washington, D.C., July-September 1923.

Larvae of *Culex floridanus*, D. & K., have been found in Alabama in a grassy semi-permanent pool, in permanent water with aquatic vegetation, and in a pool with a muddy bottom and almost no vegetation that had been dry for 31 days previous to the rainfall that then filled it. After the rainfall larvae were common in ditches and pools filled with rain water. The seasonal history points to an over-wintering egg with only one generation a year. The larvae of this species are unique in possessing accessory tracheal gills borne as appendages on the head and enabling them to remain at the bottom of the pool.

The females were not observed to bite.

DE MAGARINOS TORRES (C.-B.), DA FONSECA (O.) & DE ARÊA LEAO (A.-E.). **Sur la "Esponja" (Habronémose cutanée des Equidés). Du parasitisme des Mouches par l'***Habronema muscae* **(Carter).**—*C. R. Soc. Biol.*, lxxxix, no. 27, pp. 767–768. Paris, 1923.

Of 89 animals examined at the Oswaldo Cruz Institute at Rio, 7·8 per cent. (5 horses and 2 donkeys) were found to be infected with cutaneous habronemiasis. This proportion of infection was discovered in the winter, which is not sufficiently cold to reduce appreciably the numbers of *Musca domestica*. All the affected animals showed the presence of habronemic granuloma. The larvae of *Habronema* do not seem to find donkeys such favourable hosts as horses. The heads of 164 adults of *M. domestica*, collected in the stables of the Institute, showed larvae of *Habronema muscae* in 31 cases, that is, in 18·9 per cent. It therefore seems logical to conclude that *H. muscae* is the most important, and perhaps the only cause of the disease in Brazil. The "summer sores" commonly found in Europe are caused by *H. megastoma*.

ZETEK (J.). *Anopheles* **breeding among Water Lettuce. A New Habitat.**—*Proc. Med. Assoc. Isthmian Canal Zone, Jan.-Dec., 1920*, xiii, pt. 1–2, pp. 25–28. Mount Hope, C.Z., 1923.

The contents of this paper have already been noticed from another source [*R.A.E.*, B, viii, 175].

ZETEK (J.). **The Panama Canal Species of the Genus** *Anopheles*.—*Proc. Med. Assoc. Isthmian Canal Zone, Jan.-Dec., 1920*, xiii, pt. 1–2, pp. 29–56, 4 pls. Mount Hope, C.Z., 1923.

The contents of this paper have already been noticed from another source [*R.A.E.*, B, x, 11].

CURRY (D. P.). **Some Remaining Problems of Malaria Control on the Isthmus.**—*Proc. Med. Assoc. Isthmian Canal Zone, Jan.-Dec., 1920*, xiii, pt. 1–2, pp. 57–65, 1 map. Mount Hope, C.Z., 1923.

The various methods of malaria prevention are discussed owing to the repopulation of the Panama Canal Zone becoming necessary to some extent.

RILEY (W. A.) & others. **Division of Entomology and Economic Zoology.**—*30th Ann. Rept. Minnesota Agric. Expt. Sta., 1921–22*, pp. 68–73. Univ. Farm, St. Paul, 1922. [Received 27th October 1923.]

Studies of the animal parasites of foxes have been continued with special reference to survival of infection in polluted soil. A serious otocariasis of foxes caused by the mite, *Otodectes cynotis*, has been widespread. Infestations may frequently result fatally. Experimentally mites survived for more than two weeks after removal from their host, showing that infested pens are an important factor in the spread of the parasite. This species causes serious trouble and not rarely death in cats, dogs and ferrets.

Dermacentor albipictus has been recorded for the first time on moose in north-western Minnesota, and is believed to cause their death in that region. In some parts of the north-western United States and Canada it is a serious parasite of cattle and horses.

Careful experiments, including inoculation, animal feedings and ingestion of the powdered beetles, have failed to reveal any basis for the belief that *Calandra* (*Calendra*) *granaria* possesses vesicating properties similar to those of blister beetles.

BEQUAERT (J.) & DAVIS (W. T.). **Tabanidae of Staten Island and Long Island, N.Y.**—*Bull. Brooklyn Ent. Soc.*, xviii, no. 4, pp. 113–122. Brooklyn, N.Y., October 1923.

A list is given of 23 species of *Tabanus*, 1 of *Merycomyia* and 22 of *Chrysops* recorded on Staten and Long Islands, together with a revised list for comparison of the New Jersey Tabanids, including *Chrysops hilaris*, O.S., which is recorded for the first time from that State.

GIBSON (A.). **Insects affecting Man and Domestic Animals.**—*Canada : Dept. Agric., Rept. Domin. Ent. 1919 & 1920*, pp. 24–25. Ottawa, 1923.

A brief summary is given of investigations on mosquitos in the Fraser River Valley of British Columbia [*R.A.E.*, B, x, 127, 167, etc.]. Some progress was made in 1919 in the study of black-flies, particularly of *Simulium simile*, Mall., infesting cattle [*R.A.E.*, B, x, 181]. Further observations have been made on warble-flies [*Hypoderma*], which have been reported as abundant and causing annoyance to cattle. In 1920 *Lyperosia irritans*, L. (*Haematobia serrata*, R.-D.) was numerous in Manitoba.

BISHOPP (F. C.). **The Rat Mite attacking Man.**—*U.S. Dept. Agric.*, Dept. Circ. 294, 4 pp. Washington, D.C., October 1923.

Liponyssus bacoti, Hirst, has recently been recorded from the Southern United States as attacking man, and coincident with the outbreak in Texas here described there was a tremendous increase of rats, which began in 1920, reaching its maximum in the early summer of 1921. The author has found the mite associated chiefly with the brown rat, *Mus* (*Rattus*) *norvegicus*, but it also seems to feed on various species of rodents and other warm-blooded animals. The mites feed largely on the young and adult rats when in their nests.

In confinement apart from the host they live as long as 10 days. Both the nymphs and adults attack man freely. No specific disease has been connected with them. The principal remedy for this pest is rat control. A mixture of 1 part anthracene oil and 2 parts kerosene has been used on floors with success and repelled the mites for several days. Cabinets, desks and shelves may be sprayed with a fine mist of petrol. Fumigation with hydrocyanic acid, using 10 oz. sodium cyanide (96–98 per cent.) for each 1,000 cu. ft. of space, is recommended. Pyrethrum, when fresh, is of some value if used frequently, but it is essential to get at the nesting places of the rats to secure satisfactory control.

ELLENBERGER (W. P.) & CHAPIN (R. M.). **Cattle-fever Ticks and Methods of Eradication.**—*U.S. Dept. Agric.*, Farmers' Bull. 1057, 32 pp., 5 figs., 4 tables. Washington, D.C., revised January 1920. [Received 5th November 1923.]

This is a revision of an earlier bulletin [*R.A.E.*, B, viii, 72].

CRAMPTON (G. C.). **The Cave Cricket, *Ceuthophilus*, as a possible Vector of Pathogenic Organisms.**—*Jl. Econ. Ent.*, xvi, no. 5, p. 460. Geneva, N.Y., October 1923.

Attention is called to the possible danger of infection from cave crickets (*Ceuthophilus*), which are numerous in the open latrines of summer camps. During the night these crickets frequently crawl about the food on pantry shelves and thus might easily become vectors of the germs of disease.

FERGUSON (E.). **The Distribution of Insects capable of carrying Disease in Eastern Australia.**—*Med. Jl. Australia*, 10th Yr., ii, no. 13, p. 339. Sydney, 29th September 1923.

The importance of studying not only insects that are known vectors of disease, but also those that are potential carriers, is pointed out. Six species of *Anopheles* are known to occur in Australia; four being local and quite rare. The two important species are *A. annulipes* and *A. barbirostris* var. *bancrofti*, the former being the chief if not the only vector of malaria. Yellow fever has not been introduced into Australia, but severe epidemics of dengue fever have occurred. *Aëdes argenteus* has been found to occur widely, but not in the southern parts of Victoria and South Australia, as has been reported. *Culex fatigans*, the common house mosquito, is probably the vector of filariasis in Australia, and is universally present in the settled districts. In Fiji, Samoa and the Ellice Groups, however, the vector is *Aëdes* (*Stegomyia*) *variegatus*, which has not been recorded on the mainland of Australia. Where it occurs, filariasis is non-periodic, and, judging from certain characteristics of the disease, it is by no means certain that the species of *Filaria* with nocturnal and non-periodic larvae are identical.

Tabanids, of which 230 species have been described in Australia, are of interest as potential carriers of disease. They are suspected of acting as vectors of anthrax in an outbreak that occurred in New Zealand some years ago, and are possible vectors of *Onchocerca gibsoni*, the causal agent of worm nodules in cattle. *Xenopsylla cheopis* is the dominant flea all over the northern part of the continent. In

Sydney, about 47 per cent. of the fleas belong to this species, the percentage being higher in Queensland. *Ceratophyllus fasciatus* forms 17·7, and *Ctenopsylla musculi* 34·4 per cent. of the rat-flea population in Sydney, but these are practically absent from rats in Queensland. All the forms of lice infesting man are present in Australia, but none of the louse-borne diseases has become permanently established.

Destruction of Insects.—*Med. Jl. Australia*, 10th Yr., ii, no. 13, p. 341. Sydney, 29th September 1923.

In the course of a discussion on this subject at the Pan-Pacific Science Congress held at Melbourne and Sydney in 1923, Dr. J. S. Purdy, speaking on petroleum as a mosquito larvicide, mentioned the success obtained in Egypt with the use of bags of sawdust saturated with petroleum. These, placed in stagnant water, release the oil from the sawdust slowly and continuously. Professor Shozo Todo had found that the action of petroleum in killing mosquito larvae depended on the action of the volatile matters in petroleum with a low flash point. The volatile oils have a special affinity for the respiratory membrane of mosquito larvae. It is not necessary to cover the whole surface of water to kill the larvae and pupae of mosquitos in it.

's Heeren (—). **Rapport sur la Mission de la maladie du sommeil de l'Uele.**—*Ann. Soc. belge Méd. trop.*, ii, no. 1, pp. 83–110, 1 map. Brussels, 1922. [Received 12th November 1923.]

In the Lower Welle *Glossina palpalis* is the most widely spread tsetse-fly. *G. fusca* was captured in three places only. Clearing is necessary and practicable at certain spots, but it is not possible on a large scale.

Rodenwaldt (E.). **Entomologische Notities II.**—*Geneesk. Tijdschr. Ned.-Indië*, lxiii, no. 4, pp. 500–507, 1 map. Batavia, 1923.

The distribution of Anophelines in the Indian Archipelago (Timor and surrounding islands) is shown in a table.

Anopheles (*Myzomyia*) *ludlowi*, which appears to be the chief carrier of malaria, seems to be limited to the volcanic Lesser Sunda Islands, being absent from those islands in the south that are of limestone formation. *A. subpictus* (*rossi*) does not extend so far eastwards as *A. ludlowi*, the boundary line running between Alor and Wetar. The eastern limit of *A. ludlowi* runs east of Roma, Wetar and Celebes. This is also the limit for other Anophelines, such as *A.* (*M.*) *minimus aconitus*, of which only the non-typical form of larva occurs in the easterly portion of its region, *i.e.*, east of Sumba. *A.* (*M.*) *hyrcanus* (*sinensis*) occurs within the area of *A. ludlowi*, but is confined more to the western portion of the Sunda Islands. It could not be found in the region of Timor. Further investigation must confirm whether *A.* (*Nyssorhynchus*) *fuliginosus*, in the region of Timor, is limited to Sumba, Timor and the Lesser Sunda Islands. The eastern limit of *A. ludlowi* does not coincide with that of more ubiquitous species, such as *A.* (*M.*) *barbirostris* and *A.* (*M.*) *vagus*. Nor does it apply to *Anopheles* (*Stethomyia*) *aitkeni*, which occurs in Sanasa, Amboina, New Guinea and Alor.

In the Dutch East Indies *A.* (*N.*) *maculatus* has not yet been found naturally infected with malaria. In Alor it occurs in mountain pools

up to 2,400 ft. without being associated with *A. minimus aconitus*. It would seem to play a serious part in the transmission of malaria that occurs in this hilly area. It also occurs in pools in a malarial locality in Timor. As regards the transmitter of malaria eastwards of the limit of *A. ludlowi*, *A.* (*N.*) *annulipes* is the only Anopheline in the island of Damar where malaria is present. Swellengrebel has come to the conclusion that *A. barbirostris* is the Dutch East Indian mosquito least adapted to man, but this was not confirmed in the islands of the Timor group, for the author found that this species represented one-third of the mosquitos captured indoors. In the localities examined there were no cattle or buffalos, and this may account for the more domestic character of this species.

At Karuni, in the island of Sumba, the larvae of *A. fuliginosus* are abnormal, having double hairs on the thorax and on each abdominal segment.

It has been suggested that brown larvae of *A. barbirostris* give rise to males and darker or black ones to females, and the author has confirmed this.

DE ROOK (H.). **Rapport omtrent een malaria-onderzoek te Moeara-Tebo.** [Report on a Malaria Investigation at Muara-Tebo.]—*Geneesk. Tijdschr. Ned.-Indië*, lxiii, no. 4, pp. 510–530, 1 map. Batavia, 1923.

Malaria is endemic in the district, but is not of a serious character. It is transmitted by *Anopheles hyrcanus* (*sinensis*) ; *A. umbrosus* is present but seems harmless. The swampy breeding-places of *A. hyrcanus* are very numerous, but do not occur in the rubber plantations. Their eradication would be a very costly matter. Other Anophelines that occur are *A. barbirostris*, *A. novumbrosus*, *A. albotaeniatus*, *A. fuliginosus*, *A. jamesi*, *A. punctulatus*, *A. leucosphyrus*, *A. kochi*, and *A. vagus*.

VAN STEENIS (P. B.). **Enkele gegevens over** *Loemopsylla cheopis* **en** *Pygiopsylla ahalae* **in verband met de epidemiologie der pest.** [Some Data on *Xenopsylla cheopis* and *P. ahalae* in connection with the Epidemiology of Plague.]—*Geneesk. Tijdschr. Ned.-Indië*, lxiii, no. 4, pp. 570–596. Batavia, 1923.

Investigations into *Xenopsylla* (*Loemopsylla*) *cheopis* in Semarang and Surakarta (Java) show that the flea-index for a village or town is not a constant ; it depends largely on the place (dwelling or warehouse) where the house-rat is captured. The data seem to indicate that the seasonal recurrence of plague is governed by the periodical rise of the flea-index. For *X. cheopis* the index is not at its height in the wet monsoon, the peak being reached from August to October.

Pygiopsylla ahalae is classed by Dr. Otten as an outdoor flea, but there is insufficient reason for accepting this view. In many areas in Java the nests of the field-rat and of *Mus rufescens* are sufficiently moist to favour the reproduction of *P. ahalae*, while those of the house-rat are too dry. At a considerable altitude (about 3,000 ft.) conditions are very favourable in the nests of the house-rat, and *P. ahalae* occurs in them just as uniformly and abundantly as in the nests of outdoor rats. *P. ahalae* does not infest *Crocidura coerulea*, probably because it finds it objectionable as a host and not because this shrew nests on the ground.

Brug (S. L.) & Haga (J.). **Aanteekening omtrent muskieten.** [A Note on Mosquitos.]—*Geneesk. Tijdschr. Ned.-Indië*, lxiii, no. 4, pp. 635–640. Batavia, 1923.

A list of mosquito records not yet included in Swellengrebel's list [*R.A.E.*, B, ix, 216] is given.

New localities where Culicines have been found are listed, in addition to the table of mosquito records previously given [*R.A.E.*, B, x, 211].

Patton (W. S.). **Some Philippine Species of the Genus *Musca*, Linnaeus.** —*Philipp. Jl. Sci.*, xxiii, no. 4, pp. 309–322. Manila, October 1923.

The species of the genus *Musca* are dealt with in three groups. The first comprises the non-biting, occasionally haematophagous species that are mainly associated with man, his dwellings and food, though often found on animals, and breed in garbage and excrement of all kinds; the second comprises the non-biting, haematophagous species that are only found on animals and in their vicinity and breed almost exclusively in cow dung; and the third are the true biting, blood-sucking species also found only on animals and in their vicinity and breeding exclusively in cow dung. *Musca bakeri*, sp.n., is described and belongs to the second group.

The author has now studied nearly all the existing species of the genus *Musca* and here gives a revised synonymy [*cf. R.A.E.*, B, x, 104] of the Philippine species, including:—*M. vicina*, Macq. (*domestica*, L. (atypical), *flavinervis*, Thoms., *determinata*, Patt. nec Wlk.), *M. sorbens*, Wied. (*humilis*, Wied., *conducens*, Patt. nec Wlk., *praecox*, Patt. nec Wlk.), *M. vetustissima*, Wlk. (*pumila*, Patt. nec Macq.), *M. conducens*, Wlk. (*Pristirhynchomyia* (*Philaematomyia*) *lineata*, Brun., *humilis*, Patt. nec Wied.), and *M.* (*Awatia*, *Philaematomyia*) *planiceps*, Wied. (*cingalaisina*, Big., *pollinosa*, Stein, *indica*, Awati). A key is given to the males of the known Philippine species of this genus.

Patton (W. S.). **A new Oriental Species of the Genus *Musca* with a Note on the Occurrence of *Musca dasyops*, Stein, in China and a revised List of the Oriental Species of the Genus *Musca*, Linnaeus.** —*Philipp. Jl. Sci.*, xxiii, no. 4, pp. 323–335. Manila, October 1923.

Musca illingworthi, sp.n., is described and belongs to the author's second group of this genus [see preceding paper]. The characters distinguishing it from *M. bakeri*, Patton, and *M. hervei*, Villen., with which it might be confused, are given.

A description is given of the male and female of *M. dasyops*, Stein, from Canton. A revised list of oriental species of *Musca* with notes on their synonymy includes: *M. domestica*, L. (*antiquissima*, Wlk., *corvina*, F.), and *M. yerburyi*, n.n. for *M. incerta*, Patt. nec Wlk.

Milton (F.). **Relapsing Fever.**—*Planters' Chron.*, xviii, nos. 39 & 40, pp. 581–584 & 603–607. Coimbatore, 29th September and 6th October 1923.

As recurrent fever is spreading in India in the plains and is likely to finds its way to the estates, this account of its seasonal occurrence, transmission by lice and treatment is given for the use of planters.

Cameron (R. D.). **Notes on Sand-fly Fever.**—*Jl. R.A.M.C.*, xli, no. 5, pp. 369–371. London, November 1923.

A table is given showing the place of infection in the 500 cases of sand-fly fever at Chanak during June to August 1923. The well-known high infectivity of buildings was confirmed, but tents within 100 yards of buildings were almost as infective as the buildings themselves, and men were infected in open camp in some cases two miles away from any building. Notes are given on the incubation period of the disease and on the possible occurrence of relapses.

Heggs (T. B.). **Some Observations on Plague in Baghdad, with a Plea for the Routine use of the Specific Antitoxic Serum in Treatment.**—*Jl. Trop. Med. & Hyg.*, xxvi, no. 21, pp. 325–328. London, 1st November 1923.

A brief account is given of the history of plague in Arabia in ancient times, and of the various outbreaks that have occurred from the 19th century up to 1923 in Iraq. *Mus rattus* is the rat concerned, but no practical means of destroying it has yet been devised. In Baghdad bubonic plague is endemic, and in the inter-epidemic periods infected rats may always be found, though in small numbers. The onset and cessation of an epidemic is determined by climatic conditions, a mean weekly maximum temperature above 100° F. and a weekly minimum temperature below 40° F. being inimical to the disease in Baghdad.

The protection afforded by anti-plague vaccine is very definite both against attack and against mortality and may last a year or even more.

Cragg (F. W.). **Observations on the Bionomics of the Bed-bug, *Cimex lectularius*, L., with special reference to the Relations of the Sexes.**—*Ind. Jl. Med. Res.*, xi, no. 2, pp. 449–473. Calcutta, October 1923.

Both sexes of *Cimex lectularius* are fully mature soon after the final moult, and mating may occur before either sex has fed. The eggs do not begin to develop until they are fertilised, and only a few are laid until after the female has had a meal of blood. Females fertilised by unfed males do not produce so many eggs as those fertilised by fully nourished ones. A male can fertilise at least 3 females in 24 hours, and mating probably occurs not less often than once a day. One fertilisation does not enable a female to oviposit indefinitely. The presence of more than one male makes no difference to the number of eggs laid. The spermatozoa are not retained intact by the female during periods of starvation at temperatures suitable for oviposition; if the period is sufficiently prolonged no eggs are laid when feeding is resumed. If conditions are otherwise favourable to oviposition, shortage of spermatozoa results in the production of deformed and sterile eggs, while lack of food does not.

Barraud (P. J.). **A Revision of the Culicine Mosquitoes of India. Parts vi & vii.**—*Ind. Jl. Med. Res.*, xi, no. 2, pp. 475–506, 19 pls. Calcutta, October 1923.

In the first of these papers, which are a continuation of others previously noticed [*R.A.E.*, B, xi, 161, etc.], the adult stages of some Indian species of *Finlaya* are dealt with. As several of these species

resemble *Stegomyia* in general appearance and habits, a knowledge of their identification is of particular importance medically. The general characters of the species are discussed and fourteen are here dealt with. Keys to the males and females of most of them are given.

The second paper discusses the general larval characteristics of the known Indian species of *Stegomyia* and *Finlaya* and deals in particular with the larvae of *Aëdes* (*S.*) *vittatus*, Bigot, *A.* (*S.*) *albopictus*, Skuse, *A.* (*S.*) *argenteus*, Poir., *A.* (*F.*) *unicinctus*, Edw., *A.* (*F.*) *greeni*, Theo., *A.* (*F.*) *chrysolineatus*, Theo. (*trilineatus*, Leic.), *A.* (*F.*) *greigi*, Barraud, *A.* (*F.*) *pseudotaeniatus*, Giles, and *A.* (*F.*) *elsiae*, Barraud, and also with those of *A.* (*Christophersiomyia*) *thomsoni*, Theo., *Mimomyia chamberlaini*, Ludl., and *Aëdomyia catasticta*, Knab.

BARRAUD (P. J.). **Two New Species of** *Culex* **(Diptera, Culicidae) from Assam.**—*Ind. Jl. Med. Res.*, xi, no. 2, pp. 507–509. Calcutta, October 1923.

Culex edwardsi, sp.n., was caught in a bungalow, and *C. whitei*, sp.n., was reared from larvae taken from pools, in Assam.

CORNWALL (J. W.). **Note on the "Resistant" Forms of** *Leishmania donovani* **found in NNN Cultures.**—*Ind. Jl. Med. Res.*, xi, no. 2, pp. 587–589. Calcutta, October 1923.

The author does not agree with Row's findings with regard to resistant forms of *Leishmania donovani* as appearing in NNN cultures [*R.A.E.*, B, x, 230]. He regards the flagellate form as a higher development of the original Leishman-Donovan body of the primary culture of the series, and as coming into being in consequence of a particular stimulus, and for a definite purpose in the life-history of the protozoon, the object of which has not yet been determined. This purpose does not seem to be fulfilled either in an NNN culture or in the stomach of the bed-bug [*Cimex*]. In the author's opinion, the Leishman-Donovan body, when introduced into the condensation fluid of an NNN tube in a drop of peripheral blood from a person suffering from kala-azar, undergoes certain developmental changes until the flagellate rosette is formed. When nutriment fails, or the products of the metabolism of the flagellates begin to exercise an adverse influence, no more rosettes are formed; the already existing free flagellates continue to exist and subdivide if they can, but no new stimulus is supplied and no further advance in development can be made. There is ample evidence of the death and disintegration of fully developed flagellates in the culture, and if these thus disintegrate it seems impossible for Row's "resistant bodies" (flagellates with short flagella and aflagellates) to come into existence. The majority of these are not distributed singly, but are congregated in clumps. It seems hardly possible that flagellates impelled to become resistant forms would spontaneously congregate in clumps round masses of residual protoplasm.

The author's explanation is that the bodies that Row regarded as intermediate between flagellates and "*O* bodies" are really formed by flagellates in the process of development from rosettes, which have been unable to reach their full size and vigour owing to lack of nutriment. Other members of the parent clump do not develop a flagellum at all, and are only separated by force from without, which is of course applied in putting up a preparation. Hence a certain number of aflagellate bodies can be found free. Whether, when nutriment fails, encystment

occurs or some other resistant form develops that is capable of surviving withdrawal of nutriment, drought or heat remains to be demonstrated.

TAYLOR (J.) & CHITRE (G. D.). **Comparative Experiments on the Transmission of Plague by *X. cheopis* and *X. astia* with a Discussion of certain Epidemiological Evidence as to the Relation of these Fleas to Epidemic Plague.**—*Ind. Jl. Med. Res.*, xi, no. 2, pp. 621–638. Calcutta, October 1923.

As Cragg's theory that severe epidemics of plague are only likely to occur in regions where *Xenopsylla cheopis* is the predominant rat flea, while they will be absent where *X. astia* predominates [*R.A.E.*, B, xi, 113, 114],reveals many discrepancies when facts are examined, a number of tests and transmission experiments have been carried out, the results of which are tabulated. Madras rats were used in Bombay during the cold weather, and out of 11 cases in which *X. astia* was used successful transmission occurred in 3 cases, while under the same conditions 4 out of 11 experiments with *X. cheopis* were successful. Similar experiments with guinea-pigs gave 6 successful transmissions out of 8 with *X. cheopis*, and only 1 out of 8 with *X. astia*. It is therefore evident that *X. astia* is capable of transmitting epizootic plague among rats under suitable climatic conditions, though perhaps it is a somewhat less effective vector than *X. cheopis*. Climatic influences affecting the numbers, breeding and longevity of fleas are discussed with reference to the incidence of plague in the Madras Presidency. The necessity for further work on the bionomics of *X. astia* under different climatic conditions is recognised, for it seems evident that it can transmit plague in Bombay, while it fails to do so in Colombo.

Tests with *X. astia* on the human host resulted in 72 per cent. biting within 2 minutes on a single application of each flea used at temperatures between 76° F. and 84° F.

A method of identifying the species of living fleas is described in an appendix.

GILL (C. A.). **Malaria in the Punjab. The Malaria Forecast for the Year 1922.**—*Ind. Jl. Med. Res.*, xi, no. 2, pp. 661–666, 1 map. Calcutta, October 1923.

Following the lines of work described in 1921 [*R.A.E.*, B, xi, 115] a forecast of malaria for 1922 was prepared on 15th September, as soon as the rainfall statistics from all the recording stations in the Punjab were received, and was upon record about one month before the usual abrupt rise in mortality associated with Punjab epidemics. The predictions were complete absence of widespread and severe epidemic malaria in all parts of the Province, with local epidemic foci and a moderately severe degree of autumnal malaria in one new locality. These predictions were fulfilled with a large measure of accuracy.

ROSTRUP (S.). **Stuefluens Bekaempelse.** [Control of the House-fly.] —*Almanak 1922 Kjœbenhavns Observ.*, 8 pp. Copenhagen, 1922. [Received 19th November 1923.]

This a popular account of the life-history and control of the house-fly [*Musca domestica*]. Pigsties are the favourite breeding-places in Denmark, oviposition taking place on the fresh excreta.

Gansser (A.). **Die Dasselfliege, ihre Schäden und die Bekämpfung in der Schweiz.** [The Warble Fly, the Losses due to it, and Control Measures in Switzerland.]—*Landw. Jahrb. Schweiz*, xxxvii, no. 4, pp. 497–553, 23 figs. Bern, 1923.

Serious losses occur throughout Switzerland as a result of infestation of cattle by *Hypoderma bovis* and *H. lineatum*, and a campaign against them begun some years back is now being intensified. This paper is a fairly complete review of our knowledge of these flies.

Rosenbusch (F.) & Gonzalez (R.). **Garrapatización y Tristeza. Investigaciones experimentales. (II a Comunicación.)** [Experimental Investigations into Tick Infestation and "Tristeza." Second Communication.]—*Anales Soc. rur. Argentina*, lvii, no. 20, pp. 789–799, 4 figs. Buenos Aires, 15th October 1923.

These experiments were made with adult ticks, *Boophilus annulatus microplus*, Can., which is the common cattle tick and transmits both piroplasmosis and anaplasmosis. Piroplasmosis is transmitted by the tick when the external temperature is above 29° C. [84·2° F.], while anaplasmosis requires more than 34° C. [93·2° F.]. In most of the experiments at Buenos Aires, which has a temperate climate, ticks produced piroplasmosis only. The immunity from piroplasmosis obtained by inoculation is insufficient against infection by means of ticks even from the same district as that from which the vaccine was obtained. If the immunity is obtained by tick bites it is effective against infection by ticks of the same locality, but not by ticks from neighbouring ones. Anaplasmosis is not transmitted by *Haematopinus* or *Amblyomma*, nor by ingestion of ticks or infected blood or milk from an infected cow. Both diseases are hereditary in ticks.

Howard (L. O.). **The Yellow Fever Mosquito.**—*U.S. Dept. Agric.*, Farmers' Bull. 1354, 13 pp., 6 figs. Washington, D.C., October 1923.

This is a revision of an earlier bulletin on the bionomics and control of *Aëdes argenteus* (*aegypti*) [*R.A.E.*, B, ii, 160].

Stuart (G.) & Krikorian (K. S.). **Observations on *Trypanosoma evansi* based on its Occurrence in two Outbreaks of Surra in Palestine.**—*Trans. R. Soc. Trop. Med. & Hyg.*, xvii, no. 4, pp. 254–259, 1 fig. London, November 1923.

Successful inoculation experiments with *Trypanosoma evansi* in rats, rabbits and guinea-pigs are described. All attempts at cultivation of the parasite in the NNN medium and its modifications have failed. The existence of surra in Palestine, either in camels or equines, before the War cannot be proved, but it is reported that in 1917 an epidemic occurred among camels only. If this is so, the disease that has occurred amongst equines during 8 months of 1923 is manifesting itself for the first time among such animals in Palestine. Camels may suffer from a chronic form of the disease lasting 2 to 4 years. The fact that both *Stomoxys* and Tabanids are abundant throughout the country completes the chain of circumstantial evidence. Surra must therefore be recognised as a definite pathogenic entity in Northern Palestine [*cf. R.A.E.*, B, xi, 189].

SHAPIRO (J. M.). **Smoke Production as a Measure of Mosquito Control.** —*Trans. R. Soc. Trop. Med. & Hyg.*, xvii, no. 4, pp. 262–264. London, November 1923.

The principle of this measure against mosquitos in stables, rooms, etc., is to fill the place with smoke quickly in order to drive them out of corners and then to attract them to one area of light and air where they can be destroyed. The room to be smoked should have all entrances of light and air except one eliminated. The door should be covered with a white sheet made as taut as possible. A pile of dry straw should be lighted and then covered with damp straw or manure. In the case of wooden floors or a tent the smoke may be generated in a tin pan. It should be made simultaneously in the centre and in two or more corners. When the smoke fills the place the mosquitos fly to the sheet on the door, which is the only visible spot of light. When large numbers appear they should be killed promptly. In stables smoking can be carried out at any time, but in living quarters it should be done in the early morning.

MARETT (P. J.). **A Note on the Capture of a *Phlebotomus perniciosus*♂ in Jersey, C.I.**—*Trans. R. Soc. Trop. Med. & Hyg.*, xvii, no. 4, p. 267. London, November 1923.

A male of *Phlebotomus perniciosus* was captured in Jersey, Channel Islands, in September 1923. According to the available references the northern limit of this fly is the valley of the Po. During the summer at least 6 patients had an unidentified fever, which did not prove to be malaria, and enquiries in the case of children showed that none had been in the tropics, and that they had been bitten by insects. All the cases had a short fever of less than 7 days and all were negative to the typhoid group infections.

CARPENTER (G. D. H.). **Report of Senior Medical Officer in charge of Sleeping Sickness for 1920-21.**—*Uganda Protectorate: Ann. Med. & Sanit. Rept. 1921*, Appx. V, pp. 90–95. Entebbe, 1922. [Received 20th November 1923.]

An account is given of the tours made in Uganda during 1920-21, to ascertain the amount of sleeping sickness, as a result of which one large area previously closed was opened under permits that could be withdrawn if the conditions imposed were not observed. In one district *Glossina morsitans* was taken in an area infected with sleeping sickness together with *G. palpalis*. The risk is great that *G. morsitans* may become infected with *Trypanosoma gambiense*, which may then be evolved into *T. rhodesiense*. This has apparently happened in Nyasaland [*R.A.E.*, B, x, 42], and if it occurred in Uganda a very serious situation would be created.

CARPENTER (G. D. H.). **Report of Senior Medical Officer in charge of Sleeping Sickness for 1922.**—*Uganda Protectorate: Ann. Med. & Sanit. Rept. 1922*, Appx. IV, pp. 58–60. Entebbe, 1923.

In 1922 two sleeping sickness areas that had not previously been inspected in Uganda were visited. In one district all the streams may be considered to be fly-infested and adequate clearing of crossings over streams and of watering places should be enforced. In the other there is no indigenous sleeping sickness, but many of the rivers are infested

with *Glossina palpalis*. It is essential that measures be taken to prevent it from becoming infested with *Trypanosoma gambiense*, and movement of persons into the district has been regulated. An account is given of the other districts visited during the year under review.

DUKE (H. L.). **Trypanosomiasis Investigations.**—*Uganda Protectorate: Ann. Rept. Bact. Dept. 1922*, pp. 12–16. Entebbe, 1923.

The investigations made into an outbreak of sleeping sickness in Mwanza, Tanganyika Territory, have already been noticed [*R.A.E.*, B, xi, 52, 63]. Two strains of trypanosomes from infected natives proved readily transmissible cyclically by *Glossina palpalis*.

In October 1922 on Damba Island 1,755 wild *Glossina palpalis* were fed on monkeys, but none developed trypanosomes. Of 1,500 flies dissected 1·3 per cent. contained flagellates, of which ·19 per cent. were infected in the gut only, including two showing *Trypanosoma grayi*. The blood of 5 situtunga was inoculated into monkeys and *T. uniforme* was found in 3.

About 90 per cent. of the fishermen living in the eastern corner of the Uganda lake-shore showed enlarged axillary lymphatic glands, believed to be due to sleeping sickness, but their general health was good. The strains responsible for these infections are not very virulent and it is hoped to confirm by actual observation that recovery unaided by treatment occurs in many cases. During the year territory in the *G. palpalis* areas along Lake Victoria in Uganda has been re-opened to native occupation, and as cases of sleeping sickness will probably occur eventually it is important that these should be recognised early in order that the factors governing the reappearance and spread of the trypanosome in man may be studied and controlled.

METALNIKOV (S.) & TOUMANOV (K.). **La Lèpre ches les Insectes.**—*C. R. Soc. Biol.*, lxxxix, no. 31, pp. 935–936. Paris, November 1923.

Further experiments in testing the resistance of *Galleria mellonella* to various micro-organisms have been undertaken, using the bacilli of leprosy of man and rats. Large quantities were injected into the caterpillars of *G. mellonella* and into the Phasmid, *Carausius* (*Dixippus*) *morosus*. A brief résumé is here given of the observations made.

These insects appear to be completely immune from leprosy; phagocytosis in their blood at intervals of 30 to 120 minutes after injection was weak, though it increased after 24 hours. After an interval of 3 to 4 weeks, however, large agglomerations of leucocytes filled with leprosy bacilli were found in the pupae and moths as well as in the Phasmid, indicating the establishment of a kind of symbiosis between the insect and the bacillus.

LVOV (A.). **Nature et position systématique du bactéroide des blattes.**—*C. R. Soc. Biol.*, lxxxix, no. 31, pp. 945–946. Paris, November 1923.

The body discovered by Blochmann (1887) in the fat bodies of the cockroach, *Blattella* (*Phyllodromia*) *germanica*, has since frequently been studied. In this paper the work of previous authors is reviewed and the nature of the body is discussed. From the author's observations the body is regarded as belonging to the bacilli group, in which case its name is *Bacillus cuenoti*.

Jordan (K.) & Rothschild (N. C.). **Additions to the Catalogue of Swiss Siphonaptera.**—*Ectoparasites*, i, pt. 5, pp. 287–289, 1 fig. London, November 1923.

Among the species dealt with is *Ctenophthalmus orphilus*, sp.n., described from a male on *Evotomys glareolus helveticus* at St. Moritz.

Jordan (K.) & Rothschild (N. C.). **Further Records of Algerian Siphonaptera.**—*Ectoparasites*, i, pt. 5, pp. 290–292. London, November 1923.

The fleas collected in Algeria in 1920 are here recorded with their localities. *Ctenocephalus felis*, Bch., and *Ceratophyllus hirundinis*, Curt., are added to the previous records. The hitherto unknown male of *C. farreni meridionalis*, J. & R., and two individuals of *C. numidus*, J. & R., of which only one example was known, were also obtained.

Jordan (K.) & Rothschild (N. C.). **On some Siphonaptera from the Eastern Hemisphere.**—*Ectoparasites*, i, pt. 5, pp. 293–308, 18 figs. London, November 1923.

The species dealt with include the following new ones: *Xenopsylla caffer*, on *Pedetes caffer* and *Genetta senegalensis* in South Africa, *X. gratiosa*, on *Puffinus kuhli flavirostris* in the Canary Islands, *Ceratophyllus runatus*, on *Ochotoma dahurica* and *Lagomys alpinus* in Transbaikalia, *C. luculentus*, on *Cricetulus furunculus* and *O. dahurica* in Transbaikalia, *C. hirticrus*, on *O. dahurica* in Transbaikalia, *Stivalius sellatus*, on a rat in Uganda, *Ctenophthalmus olbius*, on *Oenomys bacchante* in British East Africa, *Neopsylla acanthina*, on *Mus musculus* and *Microtus regalis* in Siberia, and *Rhadinopsylla dahurica*, on *Ochotoma dahurica* in Transbaikalia.

Jordan (K.) & Rothschild (N. C.). **New American Siphonaptera.**—*Ectoparasites*, i, pt. 5, pp. 309–319, 9 figs. London, November 1923.

The species dealt with are *Actenopsylla suavis*, gen. et sp.n., from the nest of *Ptychorhamphus aleuticus* in Mexico, *Hoplopsyllus exoticus*, sp.n., on *Felis* sp. in Panama, *Pulex porcinus*, sp.n., on *Dicotyles* in Texas, *Rhadinopsylla sectilis*, sp.n., on *Peromyscus* sp. and *Mus* sp. in British Columbia, *Nearctopsylla hygini laurentina*, subsp.n., on *Mustela* sp. in New Brunswick, and *Agastopsylla boxi*, gen. et sp.n., on *Abriothrix suffusus* and *Ctenomys haigi* in Argentina.

Jordan (K.) & Rothschild (N. C.). **On the Genera** *Rhopalopsyllus* **and** *Parapsyllus*.—*Ectoparasites*, i, pt. 5, pp. 320–370, 25 figs. London, November 1923.

Among the fleas dealt with the following are described as new: *Rhopalopsyllus cacicus saevus*, on *Felis pardalis mearnsi* in Panama and *Didelphys* sp. in Trinidad; *R. australis tupinus* occurring in Amazonas and Peru and on *Icticyon venaticus* in Bolivia; *R. australis tamoyus*, on various rodents and *Didelphys* sp. in Paraguay, and *Galera barbara* in Brazil; *R. klagesi samuelis*, on *Felis pardalis mearnsi*, and *Proechimys semispinosus panamensis* in Panama, and on other rodents and *D. marsupialis* in Venezuela; *R. axius*, on *Orymycterus platensis*, *Lutreolina*

crassicaudata, *Mus* sp. and *D. paraguayensis*, *R. byturus*, on *L. crassicaudata*, and *R. acodontis*, on *Akodon* and man, in Argentina; *R. steganus*, on *Sturnira lilium* in Venezuela; *R. litargus*, on *Melanomys phoeopus* in Western Ecuador and on a rat in Peru; *R. peronis*, on *Heteromys melanoleucus* probably in Venezuela or Colombia; *R. adelus*, on *Epimys* sp. in Brazil; *R. callens* on *Ctenomys haigi*, *R. subtilis* on *Phyllotis xanthopygus*, *Parapsyllus onychius* on *C. haigi* and *Akadon iniscatus*, *P. ulus* on *Abrothrix suffusus*, *P. budini* on *Andinomys edax*, *P. fortis* on *Akodon iniscatus*, and *P. levipes* on *C. haigi*, in Argentina; *P. amplus* on *Akodon longipilis* and rats in Chile; and *P. tantillus* on *C. haigi*, and *P. bleptus* on *Reithrodon caninus*, in Argentina. A key is given to the species of *Rhopalopsyllus* and to the American species of *Parapsyllus*.

Oudemans (A. C.). **Acarologische Aanteekeningen lxix.** [Acarological Notes. lxix.]—*Ent. Ber. Ned. Ent. Vereen.*, vi, no. 128, pp. 113–120. The Hague, 1st November 1922. [Received 22nd November 1923.]

Microtrombidium wichmanni, Oud., probably from fowls; *Megninia* (*Dimorphus*) *bifida*, Nitzsch, from turkeys; and *Schöngastia salmi*, Oud., taken in grass, are recorded from Java.

Oudemans (A. C.). **Mededeelingen over Mallophaga en Pediculi V.** [Communications on Mallophaga and Pediculi V.]—*Ent. Ber. Ned. Ent. Vereen.*, vi, no. 131, pp. 163–168. The Hague, 1st May 1923. [Received 22nd November 1923.]

The larval stages of *Pediculus capitis*, DeG., *P. humanus*, L., and *P. schäffi*, Fahrh., a parasite of chimpanzees, are described.

Oudemans (A. C.). **Acarologische Aanteekeningen lxxii, lxxiii.** [Acarological Notes. lxxii, lxxiii.]—*Ent. Ber. Ned. Ent. Vereen.*, vi, nos. 132 & 133, pp. 177–188, 201–208. The Hague, 1st July and 1st September 1923. [Received 22nd November 1923.]

These notes deal with a number of new genera and new species of mites.

Reynaud (G.). **La Peste considérée dans quelques-uns de ses foyers actuels; sa diffusion et sa prophylaxie.**—*Rev. prat. Maladies Pays chauds*, iii, no. 2, pp. 93–140. Paris, October 1923.

The distribution and present centres of infection of plague are discussed, with special reference to French colonial regions. A survey of these areas indicates that meteorological and seasonal conditions do not have much influence on the incidence of plague, though generally speaking the pulmonary form of the disease predominates in the cool season and the bubonic form in the hot season. The vectors and reservoirs of plague and prophylaxis and anti-rat and anti-flea measures are discussed. An account is given of the sanitary inspection and precautions taken at the national frontiers, etc., to guard against the spread of the disease.

DELANOË (P.). **De la Spirochétose des oies dans le Cercle des Doukkala.**—*Bull. Soc. Path. exot.*, xvi, no. 8, pp. 582–587. Paris, October 1923.

Spirochaetosis of geese is now definitely recorded from Morocco. The virus is considered to be identical with that occurring in fowls in Morocco, transmission being effected by *Argas persicus*. Intravenous injections of novarsenobenzol were effective against the disease. Experimental infection of pigeons was not successful.

DELANOË (P.). **De l'infestation des rats de la ville de Mazagan par la puce chique de la poule** (*Sarcopsylla gallinacea* **W., 1875**).—*Bull. Soc. Path. exot.*, xvi, no. 8, pp. 592–593. Paris, October 1923.

Echidnophaga (*Sarcopsylla*) *gallinacea*, Westw., is recorded from rats (*Mus rattus*) from Mazagan, Morocco. Its distribution does not appear to be limited to any particular part of the town.

DELANOË (P.) & LELAURIN (A. P.). **Infestation massive d'un élevage de poulets par la puce chique :** *Sarcopsylla gallinacea* **Westwood, 1875.**—*Bull. Soc. Path. exot.*, xvi, no. 8, pp. 593–594. Paris, October 1923.

A serious infestation of fowls by *Echidnophaga* (*Sarcopsylla*) *gallinacea*, Westw., occurred at an experimental farm in Morocco during 1922. Though the infestation was so heavy that it proved fatal to many of the birds, no similar infestations could be traced where the fowls were allowed to go free and roost in the open. Under these conditions, however, *Argas persicus*, Oken, is generally present.

SALM (A. J.). **Sur quelques parasites du dindon dans les îles de la Sonde.**—*Bull. Soc. Path. exot.*, xvi, no. 8, pp. 594–598, 2 figs. Paris, October 1923.

Goniodes stylifer, Nitzsch, *Lipeurus polytrapezius*, Nitzsch, and a mite, *Megninia bifidus*, Nitzsch, are recorded as parasitising turkeys in Java. The larvae of *M. bifidus* were found in the shells of the eggs of *Goniodes*.

BOUFFARD (G.). **La chlorpicrine dans la lutte contre la peste à Madagascar.**—*Bull. Soc. Path. exot.*, xvi, no. 8, pp. 602–605. Paris, October 1923.

An account is given of the fumigation with chloropicrin against rats in Madagascar as an anti-plague measure. After 18 months' trial it is considered to be a most effective means of destroying both rats and insects, additional advantages being its low cost and the ease with which it is applied. At least 5 gm. per cubic metre [about 220 grains per cu. ft.] are necessary for the destruction of fleas, but rats are killed in 24 hours with a concentration of 2 gm. per cubic metre [about 88 grains per 100 cu. ft.].

Escomel (E.). **Les Pseudo-méloïdes du Perou et la Pseudoméloïdine. Emploi de ces insectes en thérapeutique à l'epoque des Incas.**—*Bull. Soc. Path. exot.*, xvi, no. 8, pp. 615–621. Paris, October 1923.

Beetles of the genus *Pseudomeloë* were used by the Incas as at the present time for the cure of corns and warts. The active principle is cantharidin. The chemical properties of the blood of these beetles are described, and its action on human warts and on animals is discussed. Brief notes are here given on 10 species of *Pseudomeloë* recorded from Peru, including one new one.

Edwards (F. W.). **New and little-known Nematocerous Diptera from Java.**—*Treubia*, iii, no. 2, pp. 180–183. Buitenzorg, February 1923.

The new species described include *Forcipomyia karnyi*.

Hoare (C. A.). **An Experimental Study of the Sheep-trypanosome (*T. melophagium*, Flu, 1908), and its Transmission by the Sheep-ked (*Melophagus ovinus*, L.).**—*Parasitology*, xv, no. 4, pp. 365–424, 5 figs., 5 pls., 12 tables. Cambridge, November 1923.

The history of the study of trypanosomiasis in European domestic sheep is reviewed [*R.A.E.*, B, x, 222 ; xi, 160]. *Melophagus ovinus*, L., never leaves its host, except accidentally, and if removed usually dies in 4–8 days. It requires a fairly high temperature and a certain degree of humidity. Each female deposits on the average 10–12 pupae during her life, the average duration of which is 4–6 months. The pupae are attached to the wool by means of a sticky secretion. The whole development takes place on the sheep, the incubation period lasting 19–36 days according to the season. A newly emerged female reaches sexual maturity in 14–30 days. Experimental infection of sheep proved that infection with *Trypanosoma melophagium* is by the contaminative method, *per os*. To demonstrate that the infective stages of the trypanosome are produced in the hind gut of the ked, only the abdomens of the latter were used. In nature infection may take place by the sheep biting off the keds and crushing them in the mouth. In experiments the sheep were not infected through abraded skin nor by being bitten by known infected keds. Various experiments have been made to infect laboratory animals with *T. melophagium*, and the results prove conclusively that it is incapable of infecting mice, rats or guinea-pigs. The means by which it may be distinguished from other trypanosomes are given ; morphologically it closely resembles *T. theileri*. The trypanosome is fully described, and details as to its incidence in sheep, its transmission, and its development in the host and in cultures are given.

Legendre (J.). **Sur la zoophilie de certaines moustiques et son application à la prophylaxie.**—*C. R. hebdom. Acad. Sci.*, clxxvii, no. 17, pp. 790–793. Paris, 22nd October 1923.

Careful research shows a frequent preference for animals by *Culex pipiens*, a preference that becomes absolute in Brittany. It has been found that breeding *Anopheles maculipennis* near dwellings does not

result in a preference for man by the adult, and *C. pipiens* is found to dislike man under conditions that should have maintained its well-known preference for human blood. It is suggested that the introduction of mosquitos that prefer animals into districts where the mosquitos prefer man might be beneficial.

ROUBAUD (E.). **Sur les conditions physiologiques du zootropisme chez les moustiques.**—*C. R. hebdom. Acad. Sci.*, clxxvii, no. 21, pp. 1066–1068. Paris, 19th November 1923.

As a criticism of the preceding paper it is argued that the preference of mosquitos for any special food cannot be rigid, since it largely depends on what food is available, and that no experiments can be conclusive that ignore this fact. Moreover, the whole circumstances of the mosquitos prior to an experiment must be known and taken into consideration. The author released females of *Anopheles maculipennis* not freshly gorged with blood, taken from a pig-sty, in a room containing human beings, but the insects did not attempt to bite. Other females of the same species kept in captivity for several days with plenty of water, but no blood, when set at liberty at once attacked man with avidity.

Introducing mosquitos that prefer animals into districts infested with those that prefer man would be useless as a protective measure unless numbers of animals were also introduced. In the case of *Culex pipiens* emerging at the end of May, a delay of 23–35 days has been observed before the first feed of blood. Any experiments, therefore, carried out with freshly emerged mosquitos are of little value. The absence of a supply of water also invalidates such experiments, since the necessity for water takes precedence of that for food.

ILINSKI (A. M.). **Список Вредителей Сельского Хозяйства Астраханского Края.** [List of Agricultural Pests of the Astrakhan Region.]—**Записки Астраханс. Станц. Защиты Раст. от Вредителей.** [*Notes Astrakhan Sta. Plant Protect.*], i, pt. 2, pp. 1–44. Astrakhan, 1923.

This list includes the insect pests affecting domestic animals, birds and man, occurring in the greater Astrakhan region including part of the province of Tzaritzin.

BORCHERT (A.). **Ueber das Vorkommen von Bakterien aus der Paratyphusgruppe im Darmkanal der gesunden Honigbiene. Vergleichende biologische Untersuchungen an einigen aus der Biene stammenden Bakterienarten.** [On the Occurrence of Bacteria of the Paratyphus group in the Intestine of the healthy Honeybee. Comparative biological Investigations on some species of Bacteria from the Bee.]—*Arb. Biol. Reichsanst. Land- u. Forstw.*, xi, no. 7, pp. 507–565. Berlin, 1923.

The title of this paper indicates its contents.

Dummy versus Zebra to attract Tsetse Flies. Poisoning Tsetses. —*Jl. Dept. Agric. Union S. Africa*, vii, no. 5, pp. 389–390, 1 fig. Pretoria, November 1923.

Further experiments with dummy animals carried out by Harris [*R.A.E.*, B, xi, 157] appear to confirm his theory that tsetse-flies are attracted to an animal by sight rather than by scent. When the dummy was tested side by side with a living ox, the latter attracted more than double the number of flies, but when a tame zebra was substituted for the ox the majority of the flies attacked the dummy.

It has been found that *Glossina pallidipes* is easily poisoned in confinement by a solution of sodium arsenite.

Martinaglia (G.). **Papies or Bots in Horses.**—*Jl. Dept. Agric. Union S. Africa*, vii, no. 5, pp. 420–427, 6 figs. Pretoria, November 1923.

An account is given of the bionomics of *Oestrus* (*Gastrophilus*) *intestinalis*, *O.* (*G.*) *nasalis* and *O.* (*G.*) *pecorum* infesting horses in South Africa, with notes on the prevention and treatment of infestation.

Wahl (R. O.) & Du Plessis (S.). **Combating Sheep-maggot Flies.**—*Jl. Dept. Agric. Union S. Africa*, vii, no. 5, pp. 428–432, 1 diagram. Pretoria, November 1923.

A number of traps, particularly the Australian trap (fig. 1) and the modified Edwards trap (fig. 2), were experimented with to find one efficient and simple to construct, the latter proving the superior. This trap consists of two paraffin or petrol tins placed one above the other and suitably held in this position. The upper tin contains a wire-gauze pyramid and is the trap proper, while the lower tin is a container for the bait. The top of the lower tin should be cut as near the re-inforced edges as possible and the cut edges bent in. On each of the 4 faces of the tin an entrance should be made for flies, by making a straight cut 5 in. long parallel to the bottom of the tin. From each end of this cut another cut is made, $\frac{1}{2}$ in. long and at right angles to the original cut and away from the bottom. The flaps so formed should be bent slightly outwards. The bottom of the upper tin should be cut out, leaving a strip about 2 in. wide all round. Slits should be made from the cut corners to the corners of the tin and the resulting flaps folded back for the time being. These flaps (A in fig. 3) later help to secure the base of the pyramid of gauze which traps the flies (see figs. 3 & 7). The top should be cut out leaving a 1 in. strip all round. This opening is the source of light, which will attract the flies in the lower tin after they have fed. Holes are punched in the strip with a long nail, and a square of wire gauze ($\frac{1}{16}$ mesh), of the size of the top of the tin, is pressed on to this strip from the inside and secured in place by thin wire passed through the holes.

The wire gauze pyramid is prepared as follows; a paper pattern should be cut out shaped as in fig. 5, where BC and DE are the width of the tin used, usually 9 or $9\frac{1}{4}$ in.; BD and CE are 2 in. and AF is 11 in. Using this, the larger pattern should be made as shown in fig. 6, still using paper; and the gauze should be cut out from it and folded in

the pyramid required. The free edges AB and AF are sewn together with fine wire leaving a small hole the size of a pencil at the apex, and the pyramid is ready for fixing into the upper tin.

The tins are held in position when superimposed by a strip of galvanised iron about 4 in. broad and secured by rivets in the upper tin. These rivets also serve to secure the gauze pyramid and the flaps shown in fig. 3 (see A in fig. 2). It is only necessary to make provision for removing dead flies. The simplest way is to cut a circular aperture anywhere in the upper tin (see fig. 2, B), about $2\frac{1}{2}$ in. in diameter. When the trap is in use this hole is pasted over with thick brown paper which should be broken to remove the flies. This should be done whenever the bait is renewed. The trap should be well painted inside and out to prevent rusting.

Traps should be placed wherever sheep congregate, *e.g.*, round water holes. It has been found that traps near together catch more flies than traps widely separated. The traps should stand on very low wooden blocks to prevent rusting, but the closer they are to the surface of the soil the better they answer. The bait consists of a quarter of a small sheep placed in the lower tin. An addition of a small amount of water once a week is required. A solution of 1 part of nicotine extract (7 per cent. nicotine) to 60 parts of water should be poured over the bait, filling the tin up to the level of the fly entrances. Arsenic should not be used as it has the disadvantage of acting as a preservative and also as a slight repellent. If eggs are deposited in the bait any maggots that hatch drop to the bottom of the tin and fall into the nicotine solution and are killed.

Various species of flies were caught in this trap in 1922-23, the commonest being *Musca domestica*, *Lucilia sericata*, *Chrysomyia albiceps*, *C. chloropyga*, *C. marginalis*, *Sarcophaga haemorrhoidalis*, *Muscina stabulans*, *Pyrellia splendida* and *Wohlfahrtia* sp. House-flies usually accounted for 50 per cent. of the catch, and 23 per cent. of the total catch for the season was composed of sheep-maggot flies.

EDWARDS (F. W.). **Mosquitoes and their Relation to Disease; their Life-history, Habits and Control.**—*Brit. Mus.* (*Nat. Hist.*), Econ. Ser. no. 4, 20 pp., 6 figs. London, 1923. Price 4d.

This is a third edition of this work. A brief account is given of the life-history and biological classification of mosquitos, their relation to disease and their control. Owing to the diversity of the breeding habits of mosquitos, the destruction of the larvae and their breeding-places is discussed under the biological classification mentioned above.

GEDOELST (L.). **Les trois stades larvaires de** *Cobboldia loxodontis*.—*Ann. Parasit. hum. & comp.*, i, no. 4, pp. 354–362, 3 figs. Paris, October 1923.

A description is given of the primary larval stage of *Cobboldia loxodontis*, Brauer, taken from the stomach of a rhinoceros, with additional notes on the second and third stages, which have been previously described. This Oestrid also infests elephants, and *C. parumspinosa*, Gedoelst, proves to be a synonym of it.

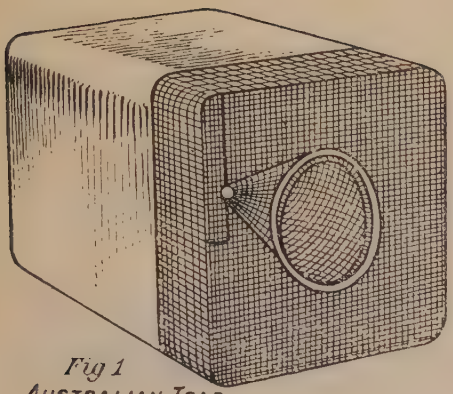


Fig 1
AUSTRALIAN TRAP

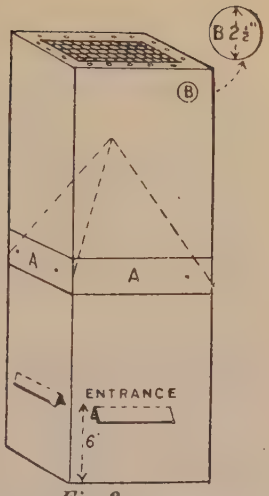
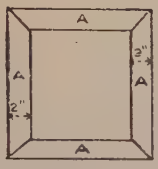


Fig. 2
MODIFIED EDWARDS TRAP.

Fig.3



BOTTOM OF UPPER TIN

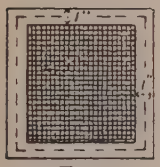


Fig.4
TOP OF UPPER TIN.

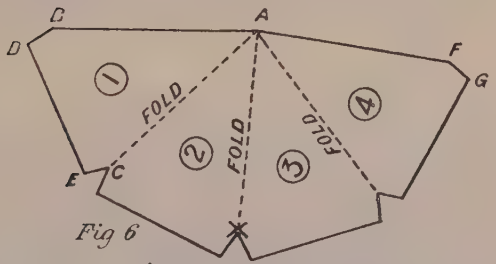


Fig 6
LARGER PAPER PATTERN

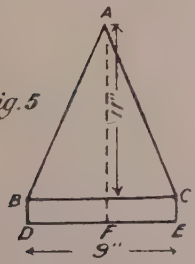


Fig.5

Fig. 7
SECTION OF UPPER TIN

Z = Position of rivet

TRAPS FOR SHEEP MAGGOT FLIES.

HIRST (S.). **On three New Species of *Laelaps* occurring on African Rodents.**—*Ann. & Mag. Nat. Hist.*, xii, no. 72, pp. 690–692. London, December 1923.

The new species are *Laelaps vansomereni* and *L. bakeri* on rodents in Uganda, and *L. parvulus* on *Arvicanthis dorsalis* in South Africa.

Amending Cattle-tick Regulations.—*N.Z. Jl. Agric.*, xxvii, no. 3, p. 204. Wellington, 20th September 1923.

Certain clauses of the principal regulations [*R.A.E.*, B, x, 144] are revoked, and similar clauses, with minor alterations, dealing with the dipping and removal of stock, substituted.

Proclamations under the Quarantine Act 1908-1920 in Force on the 31st December 1922.—20 pp. Melbourne, Dept. Health [1923].

This is an abstract of the Australian proclamations and quarantines that deal with diseases and pests of human beings, animals and plants.

[**Australia.**] **Quarantine Regulations 1922. Statutory Rules, 1923, No. 18.**—58 pp. Melbourne, 1923.

These regulations repeal a large number of former ones and include all details as regards the quarantine of human beings, animals, plants, etc., with methods of disinfection and treatment.

FIEBIGER (J.). **Die tierischen Parasiten der Haus- und Nutztiere, sowie des Menschen.** [The Animal Parasites of Domestic and Useful Animals and Man.]—2nd revd. & enl. edn., xvi + 439 pp., 353 figs., 1 pl. Vienna and Leipsic, Wilhelm Braumüller, 1923. Price 20 Swiss francs.

This is a text-book for students and veterinary workers, and is divided under the general headings, Protozoa, worms and Arthropods. Systematic lists are given of the parasites and their hosts; and the hosts and their parasites, with the part of the body attacked. Central European parasites, the important foreign forms, and those infesting man are dealt with, and numerous tables are given to facilitate the identification of the various species. The first edition was published in 1912, and the second contains much additional information, especially on the parasites of man.

ENDERLEIN (G.). **Vorläufige Diagnosen neuer Tabanidengenera (Dipt.).** [Preliminary Diagnoses of new Tabanid Genera.]—*Deutsch. Ent. Zeitschr.*, 1923, pt. 5, pp. 544–545. Berlin, 15th November 1923.

Preliminary descriptions are given of 21 new Tabanid genera.

BARRETO (A. L. de B.). **Notas entomologicas II. Estudo sobre a anatomia do genero *Triatoma*. Apparelho salivar.** [Entomological Notes II. A Study of the Anatomy of the genus *Triatoma*. The Salivary Apparatus.]—*Mem. Inst. Oswaldo Cruz*, xv, no. 1, pp. 127–130, 5 pls. Rio de Janeiro, 1922. (Also in English: Translations, pp. 50–52.) [Received 1st December 1923.]

The title of this paper indicates its contents.

Antonibon (A.). **Azione del petrolio sulle larve di zanzara.** [The Action of Petroleum on Mosquito Larvae.]—*Ann. d'Igiene*, xxxiii, no. 11, pp. 796–801, 1 fig. Rome, November 1923.

According to Le Prince and Orenstein the larvicidal action of petroleum is due to the film preventing direct contact with the air, to the penetration of the oil into the tracheae, which it obstructs, and to the specific toxicity of the oil [*R.A.E.*, B, iv, 98]. The author has endeavoured with larvae of *Culex pipiens* to ascertain the relative value of the first two factors, and finds that the mechanical action of the oil is of secondary importance. While the lack of air is lethal its action is less rapid than that of petroleum. The penetration of the latter into the tracheae by capillarity is the important factor. From the practical point of view this means that an unbroken film of petroleum is not necessary when oiling ditches, etc.

Schuurmans Stekhoven, Jr. (J. H.). **De bloedzuigende Arthropoda van Nederlandsch Oost-Indië. V. De bestrijding der luisvliegenplaag. VI. De teeken van de kleine Soenda-eilanden.** [The Blood-sucking Arthropoda of the Dutch East Indies. V. Measures against the Hippoboscid Pest. VI. The Ticks of the Lesser Sunda Islands.]—46 pp., 1 pl. Buitenzorg [1923].

The first of these papers deals with *Hippobosca maculata*, Leach. Effective measures against it imply the mass-destruction of the flies on horses, for which the author has advised placing in a darkish room a dipping tank containing water covered with a film of petroleum, advantage being taken of the phototropic tendency of the flies to collect them at the windows [*R.A.E.*, B, xi, 110]. In experiments it was found that the Hippoboscids did not abandon the horses when the latter were dipped; consequently there is no need for the room with trap-windows. Petroleum and Diesel oil were the only substances found suitable for dipping fluids, though further work with soap solutions may enable their defects to be obviated. In the actual dipping of horses petroleum proved to be the best material. After dipping 16 horses twice, 3,750 flies were taken from the tank, 660 from the drip corral, and 1,785 were removed from 5 horses. Assuming a uniform infestation, the 16 animals must have harboured about 632 apiece.

Some information on the anatomy of the larva and adult of *H. maculata* is given in a supplementary note.

The second paper records some observations on ticks collected in the Lesser Sunda Islands. The Argasid, *Argas persicus*, Oken, was found in cracks in horse corrals, and probably attacks horses. The Ixodids found were *Boophilus annulatus*, Say, on cattle and horses; *Rhipicephalus sanguineus*, Latr., on a dog; *R. haemaphysaloides*, Sup., on a pig and sheep; *Haemaphysalis* sp., on dogs; and *Amblyomma testudinarum*, Koch, on a buffalo.

Surcouf (J. M. R.). **Note synonymique sur un Diptère piqueur (Taon) de l'Inde.**—*Bull. Soc. ent. France*, 1923, no. 15, pp. 196–197. Paris, 1923.

From an examination of specimens and from Fabricius' short description, the author comes to the conclusion that the Tabanid from India, China, etc., generally known as *Tabanus striatus*, F., does not really belong to that species, and that the true *T. striatus* is the same as the insect afterwards described by Walker as *T. hilaris*. He therefore proposes the new name *T. strophiatus* for *T. striatus*, auct.

WHITTINGHAM (H. E.) & ROOK (A. F.). **Observations on the Life-history and Bionomics of** *Phlebotomus papatasii.*—*Brit. Med. Jl.*, no. 3285, pp. 1144–1151, 2 pls. London, 15th December 1923.

In view of the short life of the adults of *Phlebotomus papatasii* and the assumption that the virus of sandfly fever only remains in the human blood for 48 hours (though it is possible that relapses may occur 46 days later) the question arises as to the method by which the virus is carried over in the winter. It has been shown, however [*cf. R.A.E.*, B, xi, 61], that the virus is passed from generation to generation of *P. papatasii*. The disease has been transmitted to man by flies bred in sterile soil in England. It is hoped that further experiments will determine whether infection is inherited, or acquired by the larvae as a result of feeding on the excreta or dead bodies of the parent flies. In any case *P. papatasii* is the true carrier of sandfly fever, and the virus is acquired by the insect in the breeding grounds. In view of these facts a clear knowledge of its life-history and bionomics is essential, details of which are given [*cf. R.A.E.*, B, xi, 61], as well as descriptions of the various stages and the effect of such factors as temperature, etc., upon them. During the first few days the larvae feed on soft earthy material containing nitrogenous organic matter, but later they may devour the softer parts of remains of insects. They will thrive on a mixture of earth with human or sheep's blood, or earth mixed with human faeces, lizards' faeces and ground-up cockroaches, provided that the food has a thin film of surface moisture. Many larvae breed in the earth at the foot of walls and buildings, where other insects and reptiles congregate and leave their remains. The condensation of moisture on the walls at night supplies the humidity necessary to make the remains a suitable food. The adult males feed on organic matter in the earth, vegetation, clothing, or even the sweat of man. They have been kept alive for six days on water. The females can subsist on the same food as the males, but without a blood meal the eggs are not matured. They prefer warm-blooded animals.

P. minutus feeds chiefly on cold-blooded animals, though it can feed on man.

CATHCART (G. E.). **Notes on the Use of Artificial Light in Sandfly Destruction.**—*Jl. R.A.M.C.*, xli, no. 6, pp. 447–450, 2 figs. London, December 1923.

In Iraq in 1918 the use of hurricane lamps smeared with vaseline for the purpose of attracting and destroying sandflies, when the general routine methods failed, proved of considerable value. Scientific experiments with this method are desirable. After one night's use the lamp was thickly covered with dead sandflies. A suggestion is made for extending the method, for employment on a large scale, by using a revolving screen of linen covered with adhesive and illuminated by electric bulbs.

HETT (M. L.). **On a New Species of Linguatulid from Palestine.**—*Records Ind. Mus.*, xxv, pt. 3, pp. 301–302. Calcutta, July 1923. [Received 13th December 1923.]

Raillietiella spiralis, sp. n., is described from Southern Palestine, where it was found in the lung of a snake (*Coelopeltis monspessulana*).

Brunetti (E.). **A New Indian Drosophilid Fly.**—*Records Ind. Mus.*, xxv, pt. 3, pp. 303–304. Calcutta, July 1923. [Received 13th December 1923.]

Drosophila prashadi, sp. n., here described, was induced to breed on exposed bananas in the laboratory. It is likely to be confused with the Phorid, *Aphiochaeta xanthina*, Speiser (*ferruginea*, Brunetti), which also breeds on bananas and causes myiasis in man.

Jolly (G. G.). **An Automatic Fly-proof Latrine Seat.**—*Ind. Med. Gaz.*, lviii, no. 12, pp. 575–578, 5 figs. Calcutta, December 1923.

The various types of latrine seats designed for the purpose of excluding flies are discussed. The automatic model illustrated and described is especially adapted for use in India, as it complies with caste prejudices. It may be made in a portable or fixed pattern.

Oudemans (A. C.). **Studie over de sedert 1877 ontworpen Systemen der Acari ; nieuwe Classificatie ; phylogenetische Beschouwingen.** [A Study of the Systems for classifying Acari planned since 1877 ; a new Classification ; Phylogenetic Considerations.]—*Tijdschr. Ent.*, lxvi, pp. 49–85. The Hague, 1923.

The title of this paper indicates its contents.

Bonne (C.). **The male Hypopygium of** *Chagasia farjardi*, **Lutz, and the systematic Position of this Species.**—*Tijdschr. Ent.*, lxvi, pp. 112–114, 1 fig. The Hague, 1923.

The male hypopygium of *Anopheles* (*Chagasia*) *farjardoi*, Lutz, is described, as its fundamental differences from the corresponding parts in other Anophelines probably have generic value, giving *Chagasia* an intermediate position between *Anopheles* and *Aëdomyia* [*cf. R.A.E.*, B, xi, 206].

Bonne (C.). **The male Hypopygium of** *Anopheles mediopunctatus*, **Theobald.**—*Tijdschr. Ent.*, lxvi, pp. 115–117, 1 fig. The Hague, 1923.

The male hypopygium of *Anopheles mediopunctatus*, Theo., is described. Its characters give this species a position separate from *A. grabhami*, Theo., or *A. apicimacula*, D. & K., and the allied forms.

Bonne (C.). **The Eggs of** *Anopheles mediopunctatus*, **Theobald.**—*Tijdschr. Ent.*, lxvi, p. 118, 1 fig. The Hague, 1923.

The eggs of *Anopheles mediopunctatus* are briefly described.

Jacobson (E.). **Micro-Dipteren als Ectoparasiten anderer Insekten.** [Micro-Diptera as Ectoparasites of other Insects.]—*Tijdschr. Ent.*, lxvi, pp. 135–136. The Hague, 1923.

The Ceratopogonines identified in the next paper are recorded from Sumatra as attacking other insects.

DE MEIJERE (J. C. H.). *Ceratopogon*-**Arten als Ectoparasiten anderer Insekten.** [Species of *Ceratopogon* as Ectoparasites of other Insects.]—*Tijdschr. Ent.*, lxvi, pp. 137–142, 2 figs. The Hague, 1923.

The Ceratopogonines recorded in the preceding paper as sucking the juices from other insects are *Ceratopogon aeschnosuga*, sp. n., attacking an adult dragonfly, *Anax magnus*, Ramb., and *C. pectinunguis*, sp. n., attacking two adult moths—the Arctiid, *Miltochrista cruciata*, Wlk., and the Noctuid, *Simplicia marginata*, Moore.

BISHOPP (F. C.). **The Puss Caterpillar and the Effects of its Sting on Man.**—*U.S. Dept. Agric.*, Dept. Circ. 288, 14 pp., 12 figs. Washington, D.C., September 1923.

The various stages and bionomics of *Megalopyge opercularis*, S. & A., are described from Texas. This moth is distributed throughout the Southern States, and has been found as far north as Virginia, but it appears to be most abundant in Texas. In this State it has been taken on hackberry (*Celtis occidentalis*), elm (*Ulmus* spp.), cultivated and wild plum (*Prunus* spp.), sycamore (*Platanus occidentalis*), oak (*Quercus* spp.), and rose bushes (*Rosa* spp.).

There are normally two generations a year, the winter being passed in the larval stage in the cocoon. If the caterpillar comes in contact with any exposed part of the human body, irritating lesions are produced; in some cases the whole limb may swell and a form of paralysis accompanied by nausea and sometimes vomiting may set in. The severity of the sting depends partly on the size of the caterpillar and partly on the susceptibility of the person infected. Some relief is obtained by the use of iodine followed by cold applications.

The caterpillars are particularly troublesome when they infest shade trees in towns and cities. A spray consisting of 7 lb. powdered lead arsenate, 150 U.S. gals. water and 4 lb. dehydrated lime, was found to be a satisfactory means of destroying them. Weaker sprays were slow in action and the caterpillars crawled about and were thus liable to produce stings. During 1914 good results were obtained with an emulsion of engine oil and soft soap—2 U.S. gals. to 50 U.S. gals. water—with 2 lb. powdered lead arsenate.

A large number of caterpillars are destroyed by bacterial diseases, and by the Tachinid parasites, *Exorista flavirostris*, Wulp, and *Phorocera claripennis*, Macq. The Chalcid, *Chalcis ovata*, Say, and the Ichneumonid, *Compsocryptus* (*Cryptus*) *retentor*, Brullé, were reared from cocoons. Severe outbreaks of the pest may, however, occur at intervals of a few years.

BECKER (E. R.). **Transmission Experiments on the Specificity of *Herpetomonas muscae-domesticae* in Muscoid Flies.**—*Jl. Parasit.*, x, no. 1, pp. 25–34. Urbana, Ill., September 1923.

Transmission experiments with *Herpetomonas* from *Phormia regina*, *Lucilia sericata*, *Calliphora erythrocephala*, *Sarcophaga bullata*, *Cochliomyia macellaria* and *Musca domestica* indicate that the herpetomonads that occur naturally in any one of these flies can produce an infection in the other five.

It is extremely probable that *H. luciliae*, *H. calliphorae*, *H. sarcophagae* and the *Herpetomonas* from *Phormia* and *Cochliomyia* are all synonyms of *H. muscae-domesticae*.

Hearle (E.). **Mosquito Control at Banff.**—*Proc. Ent. Soc. Br. Columbia*, Econ. Ser. no. 17 & 19, pp. 187–189. Vancouver, B.C., October 1923.

The information contained in this paper has already been noticed [*R.A.E.*, B, xi, 139].

Hearle (E.). **Notes on two Mosquitoes from British Columbia (Culicidae, Diptera).**—*Canad. Ent.*, lv, no. 11, pp. 265–266. Orillia, Ont., November 1923.

In view of a correction made by Dyar in his description of *Aëdes mutatus*, *A. hewitti* [*R.A.E.*, B, xi, 158] falls as a synonym of it.

A. idahoensis, Theo., is recorded for the first time from British Columbia.

Hadwen (S.). **Insects affecting Live Stock.**—*Canada Dept. Agric.*, Bull. N.S. no. 29 (Ent. Bull. no. 24), 32 pp., 19 figs. Ottawa, 1923.

An account is given of the principal insect parasites of stock in Canada and of the methods of dealing with them.

The losses occurring as a direct result of insect parasites are very large; about 27·5 per cent. of the hides are seriously damaged each year by warble flies (*Hypoderma* spp.). Blood-sucking flies, although not conveying any fatal disease in Canada, worry the animals considerably, and in this bulletin particular importance is given to the protection of stock from flies by assisting them to escape their attacks, either by housing them or by the construction of fly shelters in the pastures. Dipterous pests occupy the bulk of the survey, but fleas, lice, mites, mange and ticks also receive attention, and brief notes are given on the more important worms that pass certain of their stages in dung beetles [Scarabaeids]. *Gongylonema scutatum* lives in the oesophagus of cattle, sheep and horses, and the eggs that are present in the faeces are swallowed by dung beetles, several species of which act as intermediary hosts. The beetles are swallowed by stock while grazing [*cf. R.A.E.*, B, iv, 63]. *Arduenna strongylina* and *Physocephalus sexalatus* live in the stomachs of pigs and are very harmful to them. They pass certain stages of their life-history in beetles. *Macracanthorhynchus hirudinaceus* lives in the small intestines of pigs, causing large sores or ulcers. The eggs are passed out in the faeces and are swallowed by the larvae of dung beetles. They hatch and develop in the larvae and are in turn eaten by the pigs, in which they reach maturity. Measures against dung beetles chiefly consist in the treatment of manure, which should be scattered at least twice a week so that it dries thoroughly, as the larvae only develop in fresh manure. Pigs are particularly liable to pick up beetles in permanent pig yards on bare ground. Digging or ploughing under the surface is a useful measure, but cannot be repeated often as the eggs of some kinds of worms are very resistant and when turned up again are still capable of hatching.

Gilmer (P. M.). **Derris as a Parasiticide.**—*19th Rept. Minnesota State Ent. 1921–22,* pp. 41–49. Univ. Farm, St. Paul, Minn., 1st November 1923.

Experiments have been made to test the value of derris [*cf. R.A.E.*, A, vii, 496; B, x, 122] against external parasites on cats, dogs, rats and fowls, the insects being *Ctenocephalus canis,* Curt., *C. felis,* Bch., *Polyplax spinulosus,* Burm. (rat louse), *Menopon biseriatum,* Piaget, and *Lipeurus heterographus,* Nitzsch (chicken lice), *Ceratophyllus fasciatus,* Bosc. (rat flea), *Periplaneta americana,* L., and *Blattella* (*Blatta*) *germanica,* L.

Undiluted, the powder kills all parasites, but is also fatal to vertebrates (rats were used in this particular test, and they probably licked the poison off their fur). It is most effective when used at the rate of 20 per cent. with the addition of 80 per cent. tobacco dust. This mixture applied to the coat of the infested animal, or even to the bedding or nest, destroys all parasites, and it is also effective against cockroaches, though less so than sodium fluoride. In the case of fowls also it is not more effective than sodium fluoride, but it has the advantage of being less irritating to the mucous membranes of the fowl and operator. It is about as effective as pyrethrum, but its insecticidal power is more stable. It seems however to lack the instantaneous effect of the latter, and does not kill flies when it is blown into the air. As it does not lose its efficiency upon exposure to air, experiments are to be made with regard to its value in the treatment of nesting material for sitting hens.

The use of liquid derris is not recommended on animals.

Eigenmann (C. H.). **Yellow Fever and Fishes.**—*American Naturalist,* lvii, no. 652, pp. 443–448, 5 figs. Lancaster, Pa., September–October 1923.

Attention has been given to the possibility of utilising fish to control yellow fever in Ecuador and Peru. Probably most young fish eat mosquito larvae, but some are more effective than others. *Lebistes* (*Acanthophacelus*) *reticulatus* is believed to have been responsible for the absence of yellow fever in Trinidad. In North America *Gambusia* is the chief larvicidal fish. Besides *L. reticulatus,* the most useful ones in South America are *Pygidium piurae, Lebiasina bimaculata* and " chalacos."

Blacklock (B.) & Thompson (M. G.). **A Study of the Tumbu Fly, *Cordylobia anthropophaga* Grünberg, in Sierra Leone.**—*Ann. Trop. Med. & Paras.,* xvii, no. 4, pp. 443–510, 4 pls., 5 figs. Liverpool, 21st December 1923.

This detailed paper gives the results of an extensive study of the morphology and bionomics of *Cordylobia anthropophaga,* Grünb., carried on during the dry season 1922-23 in Sierra Leone, and should be consulted in the original by those interested in the subject. Certain new facts regarding the habits of the adults, their method of oviposition and the number of eggs laid by them are recorded. Attention is drawn to morphological peculiarities in the first larval stage that appear to be closely connected with the process of penetrating the

skin. The discovery of puparia in the burrows of wild rats suggests the direct association between *C. anthropophaga* and these animals, which appear to be the main reservoir of the fly in nature. Previous literature on this subject is reviewed.

The eggs are found just under the surface of sand or other material such as cotton wool, and adhere to the medium in which they are deposited. At room temperature they hatch as a rule in 3 days; exposure to sun for an hour does not prevent them from hatching, but none hatched after exposure for 4 days. Exposure to temperatures of 45°C. 113°F. for two minutes killed all eggs. Ironing at a temperature suitable for pressing clothes also destroyed the eggs. The newly hatched larvae were capable of penetrating the unbroken skin in man and all the warm blooded animals tested. The power of penetration was gradually lost, having almost disappeared in about a fortnight. The larvae did not penetrate the skin of various reptiles. The method of penetration is described. Living tissues are the natural food of the larvae. The first moult occured about the third day after penetration. Larvae that had been removed from the host, or had left the host, burrowed into the sand when available for pupation. Occasionally pupation occurred on a dressing applied to a lesion. An immunity has been proved experimentally to develop both in man and animals, as a result of which larvae that had penetrated the skin were unable to mature. Older animals also apparently possess a relative immunity. The development of an immunity in the case of cattle in similar forms of myiasis caused by other flies is considered a possibility and worthy of investigation. A comparison is made between *C. anthropophaga* and some other myiasis-producing flies. Of the various substances applied to the lesions, liquid paraffin was found to be most efficacious and practical. A film of paraffin is placed over the opening of the skin, and the larva is expressed by the fingers, the exact procedure being described.

All adults should be captured and destroyed daily. The eggs and larvae contained in sand intended for latrines may be destroyed by heating the sand. All animals should undergo a weekly examination, and any larvae found should be removed. Exposed underclothes and bed linen may carry infection to man. This may be prevented by ironing the clothes after washing, and drying and storing them immediately in covered receptacles.

DUKE (H. L.). **The Transmission of *T. congolense* by *Glossina palpalis*.**—*Ann. Trop. Med. & Parasit.*, xvii, no. 4, pp. 511-530. Liverpool 21st December 1923.

Previous work on the transmission of the proboscis-and-gut group of trypanosomes by *Glossina palpalis* is reviewed. Apparently only three instances have been recorded of the occurrence of developmental stages of trypanosomes of this group in wild *G. palpalis*. The strain of *Trypanosoma congolense* employed in transmission experiments carried out at Entebbe during 1922 and 1923, which are described in detail, was obtained from a dog that had been fed on by a batch of wild *G. swynnertoni*, of which two were subsequently found to have proboscis-and-gut infections, the salivary glands being negative.

Three out of 17 cyclical transmission experiments, performed with laboratory-bred *G. palpalis*, were successful. In the course of these 17 experiments, 1,015 flies were dissected, of which 893 lived until

the 25th day after their first feed on an infected animal; in 8 of these flies flagellates were established in the proboscis. In all the successful transmission experiments, one or more flies with proboscis-and-gut infections had fed upon the animals that acquired infection. There is every reason to believe that these flies were responsible for the transmission.

Flies with equally intense proboscis-and-gut infections were found in two experiments in which no transmission occurred. Several of these flies had fed repeatedly on monkeys without infecting them; in no case, however, did a fly with a proboscis-and-gut infection feed upon a calf without infecting it. It would appear, therefore, that monkeys are less susceptible to this strain of *T. congolense*, carried by *G. palpalis*, than are calves.

In several cases the incubation period in the monkey was very prolonged, the lack of virulence of the strain being probably due to cyclical transmission.

The apparent fact that *G. palpalis* does not carry trypanosomes of the proboscis-and-gut group in nature on the Uganda shores of Victoria Nyanza is to be explained, in part at any rate, by the partiality of the fly for animals that are not susceptible to trypanosomes of this group. It would appear, however, from these experiments, that *G. palpalis* in its natural environment is less fitted to act as a true intermediate host of the *T. congolense* group than of *T. vivax*, *T. uniforme* and *T. brucei*.

NEWSTEAD (R.). **On a New Species of** *Phlebotomus* **from Japan.**—*Ann. Trop. Med. & Paras.*, xvii, no. 4, pp. 531–532, 1 fig. Liverpool, 21st December 1923.

Both sexes of *Phlebotomus squamirostris*, sp. n., are described from Japan.

NEWSTEAD (R.). *Glossina ziemanni*, **Grünberg, a Synonym of** *Glossina palpalis* **sub-species** *fuscipes*, **Newstead.**—*Ann. Trop. Med. & Paras.*, xvii, no. 4, pp. 533–534. Liverpool, 21st December 1923.

A thorough examination proves *Glossina ziemanni*, Grünb., from Kamerun to be a synonym of *G. palpalis* subsp. *fuscipes*, Newst.

WRIGHT (W. R.). **A Preliminary Account of the Results of Surveys for Breeding-places of Mosquitoes in North Wales.**—*Ann. Trop. Med. & Paras.*, xvii, no. 4, pp. 539–547. Liverpool, 21st December 1923.

During observations on breeding-places of mosquitos in North Wales in the summers of 1921, 1922 and 1923 ten species of mosquitos were taken in the larval stage. *Anopheles maculipennis*, Meig., was common everywhere, breeding in any moderately clean water containing vegetation. The females hibernate in the warmer farm buildings. *A. bifurcatus*, L., was the commonest mosquito in North Carnarvonshire. It breeds in water of the same types as *A. maculipennis*, and hibernates in the larval stage. *Theobaldia annulata*, Schr., was common everywhere, being found in both natural and domestic collections of water. Though it normally hibernates in the adult stage, larvae hibernated in a tank, which was once frozen almost if not quite solid. *T.* (*Culicella*) *morsitans*, Theo., was found only

in one locality in pools partly filled with fallen leaves and debris. *Aëdes* (*Ochlerotatus*) *detritus*, Hal., occurred in a low-lying district in late August among vegetation and in open water. During 1922 there were apparently 3 generations in the year, and though said to hibernate in the egg stage it is evidently also able to do so in the larval stage.

A. (*O.*) *punctor*, Kirby, var. *meigenanus*, Dyar, was found in company with *Culex pipiens*, L., at altitudes well under 50 feet, and also in company with *A.* (*Ecculex*) *vexans*, Meig. *A.* (*O.*) *caspius*, Pallas, and *A.* (*O.*) *rusticus*, Rossi, were found together with the last named.

Macdougall (R. S.). **Insect and Arachnid Pests of 1921.**—Separate from *Trans. Highland & Agric. Soc. Scotland*, 39 pp., 46 figs, [Edinburgh] 1922. [Received 21st December 1923.]

The Tabanid, *Haematopota pluvialis*, which lives in wet soil or water, causes considerable annoyance to horses by its blood-sucking habits. The author has tried the remedy of smearing a few drops of oil of white birch on to horses' ears or harness, and has found this to give instant relief by repelling the flies.

Two cases are recorded of severe infection in man resulting from the transmission from horses of mange due to *Sarcoptes scabei* var. *equi*, and the importance of thorough disinfection of all clippings from infected horses and all instruments used in connection with them is pointed out.

Macdougall (R. S.). **Insect and other Pests of 1922.**—Separate from *Trans. Highland & Agric. Soc. Scotland*, 43 pp., 44 figs. [Edinburgh] 1923. [Received 21st December 1923.]

Cnemidocoptes (*Sarcoptes*) *mutans*, *C. laevis*, *Dermanyssus gallinae*, and *Lipeurus caponis* (*variabilis*), were recorded on poultry and *Trichodectes scalaris* and *Haematopinus eurysternus* on cattle. *Tabanus sudeticus* was received from the north. The flies are found from midsummer to early autumn, the eggs are deposited on plants that grow in moist soil or in water, into which the larvae pass on hatching and feed on such animal life as they find there. Only the adult females are harmful to stock.

Grassi (B.). **Anofelini italiani.**—*Atti R. Accad. Naz. Lincei*, Rendiconti—Classe Sci. fis. mat. nat., xxxii, no. 10, pp. 317–321. Rome, 18th November 1923.

Since the author's observation in 1899 that the larvae of *Anopheles maculipennis*, Mg. (*claviger*, auct.), the species common in Italy, tolerate only a very low degree of salinity, the introduction of sea water into marshy areas has often been suggested as a measure against malaria. In Palestine, however, this procedure has aggravated malarial conditions by encouraging *A. multicolor*, Camb., which thrives at a salinity of 28 per mille or perhaps even more. Besides *A. maculipennis* the following Anophelines occur in Italy: *A. bifurcatus*, L., *A. plumbeus*, Steph., *A. algeriensis*, Theo., *A. hyrcanus*, Pall. (*pseudopictus*, Grassi), *A. elutus*, Edw., and *A. superpictus*, Grassi ; and it is not certain that the larvae of the Anophelines in central and southern Italy are unable to live in saline water.

MacGregor (M. E.). **Malaria and** *Anopheles funestus* **in Mauritius.**— *Nature*, cxii, no. 2826, pp. 934–936. London, 29th December 1923.

As a result of a survey of the mosquitos of Mauritius in 1908, a plan for anti-mosquito work was suggested by Sir R. Ross. Unfortunately his recommendations were not thoroughly carried out, and owing to subsequent neglect malaria was as prevalent in Mauritius 14 years later as at the time of the survey. A list of the mosquitos recorded by Ross is given, including three Anophelines, *A. costalis*, which was considered to be the chief vector of malaria in the district, *A. mauritianus*, which could not be experimentally infected with malaria, and *A. maculipalpis*, which could not be obtained in sufficient numbers for experimental work.

A survey carried out by the author in 1922 in furtherance of Balfour's work [*R.A.E.*, B, x, 225] revealed *A. maculipalpis* in large numbers and an additional species, *A. funestus*, which it is suggested had been overlooked in the first survey, probably owing to the peculiar habit of the larvae of darting to the roots of the vegetation at the sign of approaching danger (vibrations transmitted through the earth by the tread of searchers), and clinging to the roots or even climbing a few inches up the damp surface of leaves that dip into the water. As soon as this peculiarity was discovered the larvae could be found in large numbers all over the island in suitable breeding-places. Both *A. funestus* and *A. maculipalpis* were easily infected with malaria.

There are two theories to account for the existence of malaria in Mauritius; either that the three possible vectors were always present on the island and the disease was only introduced by the importation of large numbers of Indians harbouring the parasite in their blood, or that prior to 1865, when the first considerable outbreak of malaria is supposed to have occurred, no Anopheline vector existed on the island. The author is inclined to favour the first theory, but considers it impossible to be dogmatic, as a survey of the sister island of Rodrigues showed it to be free from Anophelines and malaria, though malaria parasites were found in the blood of persons formerly residing in Mauritius. Rodrigues is 365 miles from Mauritius, and is visited regularly every 3–4 months by a steamer on which *A. costalis* has actually been found during the voyage. The only consideration that may explain the fact that Anophelines have not yet been introduced into the island is the existence of a coral reef that forces all vessels to anchor at least 1½ miles from shore.

In a comment on this paper, Ross favours the second theory, and is inclined to think that Anophelines have probably been introduced on ships since 1865. He also considers it most likely that *A. funestus* has been imported quite recently.

Reyne (A.). **Verslag van den entomoloog.** [Entomologist's Report.] —*Verslag 1922, Dept. Landbouw Suriname*, pp. 32–39. Paramaribo, 1923.

The following ticks were collected in Dutch Guiana: *Boophilus annulatus australis*, Fuller, on cattle; *Amblyomma striatum*, Koch, on a jaguar; *A. striatum* var. *fossum*, Neum., on man, a dog and *Galictis* sp.; *A. cayennense*, F., on man and a tapir; *A. mantiquirense*, Arag., and *A. oblongoguttatum*, Koch, on *Dicotyles* spp.; *A. goeldii*,

Neum., on *Boa* sp. ; *A. calcaratum*, Neum., on *Cycloturus didactylus* ; *A. humerale*, Koch, on *Testudo tabulata* ; *A. coelebs*, Neum., on a tapir ; *Ixodes loricatus* var. *spinosus*, Nutt., on *Didelphys* sp. ; the larva of *Haemaphysalis cinnabarina*, Koch, on *Dasyprocta acouchy* ; and *Rhipicephalus sanguineus*, Latr., on a dog.

Two fleas were also collected, *viz.* : *Xenopsylla cheopis*, Roths., on rats, and *Doratopsylla intermedia*, Wagn., on *Peramys brevicaudata*.

Comstock (J. H.). **An Introduction to Entomology. Part I.—The Structure and Metamorphosis of Insects.**—2nd Edn., 8vo, xix + 220 pp., 220 figs. Ithaca, N.Y., The Comstock Pubg. Co., 1920 [Received 27th December 1923.]

This edition, which has been entirely rewritten, incorporates much of the data included in earlier works by the author, notably that in the original edition of this text-book, issued in 1888, and long out of print. The titles of the four chapters are as follows : The Characteristics of Insects and their near Relatives ; the External Anatomy of Insects ; the Internal Anatomy of Insects ; and the Metamorphosis of Insects. The bibliography, arranged by authors, occupies seven pages, and most of the illustrations are newly drawn.

Martini (E.). **Lehrbuch der medizinischen Entomologie.** [A Text-Book of Medical Entomology.]—8vo, xvi + 462 pp., 244 figs. Jena, Gustav Fischer, 1923.

This text-book on medical entomology includes mites and ticks. Species that parasitise animals and convey diseases to them are also mentioned. The book is divided into sections dealing with the following subjects : Classification and morphology ; the poisonous species and parasitic species ; the various insect-borne diseases ; and the different methods of protection from insects and of destroying them. The arrangement and choice of the text, the numerous illustrations, lists of bibliographical references and indices are of a thoroughly practical nature, and though no claim to completeness is made for the work as a whole, it is a valuable contribution to the subject.

Sheather (A. L.). **The Detection of Intestinal Protozoa and Mange Parasites by a Floatation Technique.**—*Jl. Comp. Path. & Therap.*, xxxvi, pt. 4, pp. 266–275. London, December 1923.

The author describes the technique of his floatation method of detecting mange parasites, which is an improvement on that previously described [*R.A.E.*, B, iii, 119]. The scraping from the skin is placed in about 20cc. of 10 or 20 per cent. caustic potash solution and boiled until disintegration of the hair and crusts is as complete as possible. The liquid is then placed in a centrifuge tube or, more usually, distributed equally between two tubes, and the handle is given half a dozen turns. The caustic potash is then poured off and the tubes are half filled with water. A sugar solution (1 lb. to $\frac{3}{4}$-pint of water, Sp. G. 1200) is added until the tubes are filled to the lip. The solution, water and sediment are then thoroughly mixed by inverting the tubes a few times. The tubes are replaced in the centrifuge, and it is sufficient to turn the handle of a machine geared at 30 to 1 a

hundred times to bring the parasites to the top of the liquid. This requires about 75 seconds. The parasites are then collected by lowering a cover-glass into contact with the surface of the liquid (by attaching the cover-glass to a handle by means of a small beak of plasticine) and on withdrawal detaching this on to the surface of a slide. This method has been found to be effective for sarcoptic, symbiotic, psoroptic and follicular mange.

COWDRY (E. V.). **The Distribution of *Rickettsia* in the Tissues of Insects and Arachnids.**—*Jl. Exptl. Med.*, xxxvii, no. 4, pp. 431–456, 3 pls. Baltimore, Md., 1st April 1923.

This preliminary survey of the distribution of *Rickettsia* was commenced in the hope of ascertaining the factors responsible for the occurrence of such bodies and in order to obtain further information bearing upon the claim that they constitute a new class of micro-organisms distinct from bacteria. The author gives evidence to show that *Rickettsia* are true micro-organisms ; but many different organisms are grouped under this heading.

In the absence of a satisfactory definition of *Rickettsia*, the observations were arbitrarily limited to bacterium-like organisms that are intracellular and Gram-negative. *Rickettsia* of this type were found in 19 out of 111 species of Arthropods examined. Two, occurring in the Ixodid, *Dermacentor venustus*, and the bed-bug, *Cimex lectularius*, have been described in the literature, while the remaining 17 have not previously been recorded. They were found in the Attid spider, *Salticus scenicus* ; Trombidiid mites, *Atomus* sp. and *Lucoppia curviseta* ; the Argasid, *Ornithodorus turicata* ; the Ixodids, *Amblyomma americanum*, *A. hebraeum*, *Boophilus* (*Margaropus*) *annulatus*, *B. annulatus decoloratus*, *B. annulatus australis*, *Dermacentor variabilis*, *Rhipicephalus evertsi* and *R. sanguineus* ; the silver-fish, *Lepisma saccharina* ; the Chrysopid, *Chrysopa oculata* ; the fleas, *Pulex irritans* and *Ctenocephalus canis* ; and the Ichneumonid, *Casinaria infesta*. *Rickettsia* as above defined have also been recorded in the louse, *Pediculus humanus* and the Hippoboscid, *Melophagus ovinus*. The species that harbour *Rickettsia* differ widely in diet and habitat. One such species is insectivorous throughout life (*Salticus scenicus*), two are insectivorous in the larval and vegetarian in the adult stage (*Casinaria infesta* and *Chrysopa oculata*), one is chiefly vegetarian but partakes of some animal products (*Lepisma saccharina*), two (the mites) are usually entirely vegetarian, and the remainder subsist wholly upon a diet of mammalian blood. *Rickettsia* are associated in only a few cases with diseases in mammals.

The evidence at hand does not lead beyond the conclusion that the *Rickettsia* mentioned above are true Gram-negative micro-organisms, easily distinguishable from mitochondria and all other cytoplasmic and nuclear granulations, rather completely adapted to an intracellular existence, and exhibiting in some cases a remarkable degree of host specificity. They are restricted to certain tissues in some species (*e.g. Dermacentor venustus*, *Rhipicephalus sanguineus*, etc.) but widely distributed throughout the body in others (*e.g. Ctenocephalus canis* and *Cimex lectularius*). Their presence in the eggs of all the ticks recorded above and in those of the spider suggests not only that egg cells offer an unusually favourable medium for their growth and multiplication, but also that their presence may be the result of direct passage to the offspring.

AUBERTOT (M.). **Présence du** *Leptomonas davidi* **Lafont chez une Euphorbe d'Alsace.**—*C.R. Soc. Biol.*, lxxxix, no. 34, pp. 1111–1113. Paris, December 1923.

Herpetomonas (*Leptomonas*) *davidi* has been recovered from *Euphorbia cyparissias* in the vicinity of Strasbourg. The flagellates were comparatively scarce in the latex, no case of massive infection being found. This is probably owing to climatic conditions. No sucking insects, particularly Rhynchota, were found on the plants or in their vicinity.

FRANCHINI (G.). **Sur un protozoaire d'***Euphorbia cereiformis* **et sur sa culture.**—*Bull. Soc. Path. exot.*, xvi, no. 9, pp. 642–646, 3 figs. Paris, 1923.

Experiments have proved successful for the first time in culturing a protozoon isolated from *Euphorbia*. The protozoon under consideration is described and illustrated, and details are given of its culture in various media, including human blood. It was taken from *E. cereiformis*, the infected plants showing a sickly appearance. Though it is not flagellated in the latex, in the cultures it acquires the flagellate form. It varied in the different substances both in form and size.

FRANCHINI (G.). **Inoculation de flagellés d'insectes dans le latex des Euphorbes.**—*Bull. Soc. Path. exot.*, xvi, no. 9, pp. 646–650. Paris, 1923.

In the experiments here described *Euphorbia geniculata* and *E. exula* were inoculated with flagellates obtained from the digestive tract of *Musca domestica, Sarcophaga haemorrhoidalis, Calliphora erythrocephala* and *Eurydema* (*Pentatoma*) *ornatum*. The plants inoculated with flagellates from *E. ornatum* succumbed rapidly, and leishmaniform bodies were found in the latex. In all cases the inoculated plants showed definite symptoms of disease.

FRANCHINI (G.). **Sur un flagellé particulier d'une Urticacée** (*Ficus benjamina*).—*Bull. Soc. Path. exot.*, xvi, no. 9, pp. 650–652, 1 fig. Paris, 1923.

A protozoon found in the latex of apparently healthy bushes of *Ficus benjamina* in Italy is described. It was found both in the flagellate and aflagellate forms. It was remarkable in that the flagellate did not multiply by longitudinal division but by dividing transversally.

FRANCHINI (G.). **Sur un flagellé d'une Asclepiadacée** (*Arauja angustifolia*).—*Bull. Soc. Path. exot.*, xvi, no. 9, pp. 652–655, 2 figs. Paris, 1923.

Flagellates have been found in *Arauja angustifolia* in Italy, but they did not appear to be the same as *Herpetomonas* (*Leptomonas*) *elmassiani*,

which has been recorded from this plant in South America. The plant concerned in these observations was of very sickly appearance and eventually succumbed. On a composite *Erigeron canadensis*, which was abundant in the vicinity of the dying plant, a few Aphids, and numerous Lygaeids were observed, including *Lygaeus nebulosus*.

FRANCHINI (G.). **Nouvelles recherches sur les protozoaires des plantes à latex.**—*Bull. Soc. Path. exot.*, xvi, no. 9, pp. 655–659, 3 figs. Paris, 1923.

The observations here described show that besides *Herpetomonas* (*Leptomonas*) *davidi* other protozoa of very varied forms exist in the latex of various species of *Euphorbia* particularly those of the cactus type. It is supposed that all these forms are well distributed in the plant world and may occur in apparently healthy plants.

The possibility of *H. davidi* being derived from one of the flagellates of the digestive tract of insects is suggested.

RODHAIN (J.). **Trypanosome d'un Cheiroptère insectivore** *Nycteris hispida* **Schreber au Congo belge.**—*Bull. Soc. Path. exot.*, xvi, no. 9, pp. 659–663, 1 fig. Paris, 1923.

Trypanosoma heybergi, sp. n., is described from *Nycteris hispida* from the Belgian Congo. Previous records of trypanosomes from bats are reviewed. The infected animals in the present observations were infested with two species of mites, one of which was a species of *Liponyssus* (*Leiognathus*). Flagellates were only found in the latter, 6·3 per cent. of which were infected with trypanosomes and crithidial forms.

FOLEY (H.). **Présence de** *Phlebotomus perniciosus* **Newstead dans le département de la Haute-Marne.**—*Bull. Soc. Path. exot.*, xvi, no. 9, p. 664. Paris, 1923.

Phlebotomus perniciosus, Newst., is recorded from a new locality in France, Haute-Marne, at an altitude of about 800 feet.

MATHIS (C.). **La lutte contre la Peste à Phnom-Penh (Cambodge).**—*Bull. Soc. Path. exot.*, xvi, no. 9, pp. 668–675. Paris, 1923.

The occurrence of plague in Cambodia is reviewed and the hygienic improvements that are required in the capital are briefly outlined.

In the discussion following this paper Broquet points out that in various countries under different climatic conditions not only the species of rat harbouring the virus varies but also its importance as a reservoir of the disease; it is, therefore, not advisable to model all anti-plague measures on the same lines. Records of epidemics in England since 1900 show that the disease may be spread from one infected case by *Pulex irritans*, without the presence of infected rats or rat fleas. In the tropics *Mus rattus* and *Xenopsylla cheopis* are responsible for maintaining the infection; but in Europe, and

particularly England, primary infections are due to *Ceratophyllus fasciatus*, the rats concerned being *M. norvegicus* or *M. decumanus*, and the secondary cases of infection are transmitted direct from man to man by *P. irritans* [*cf. R.A.E.*, B, x, 159].

Brues (C. T.). **Is Poliomyelitis an Insect-borne Disease?**—*Scientific Mthly.*, xvi, no. 5, pp. 471–487, 12 figs. [New York, N.Y.] May 1923. [Received 27th December 1923.]

The author discusses the course of epidemics of poliomyelitis and the conclusions to be drawn from them. These do not support the theory of contact infection, but rather favour the possibility of insect transmission. Plague is compared with this disease, and it is suggested that the latter might also be transmitted from rats by fleas. These observations are largely based on studies the results of which have already been noticed [*R.A.E.*, B, x, 54].

Sellards (A.W.). **The Cultivation of a *Rickettsia*-like Micro-organism from Tsutsu-gamushi Disease.**—*Amer. Jl. Trop. Med.*, iii, no. 6, pp. 529–546, 1 pl. Baltimore, Md., November 1923.

A micro-organism closely resembling *Rickettsia* has been obtained in pure culture from animals infected with the virus of tsutsugamushi disease. It proved pathogenic to guinea-pigs when inoculated and to some extent to monkeys also, the latter showing some evidence of active immunity against the virus.

Dunn (L. H.) & Parker (R. R.). **Fleas found on wild Animals in the Bitterroot Valley, Mont.**—*Pub. Health Repts.*, xxxviii, no. 47, pp. 2763–2775. Washington, D.C., 23rd November 1923.

In connection with the work on Rocky Mountain spotted fever in 1922, many small rodents and other wild animals were examined for parasites, and while *Dermacentor venustus*, Banks, was the one chiefly sought, a number of fleas, lice and other parasites were also collected. From 388 animals, 2,275 fleas were taken, comprising 66 species, of which an annotated list is given, and the following new species are described from Montana :—*Odontopsylla spenceri*, from snowshoe rabbit (*Lepus bairdi*) ; *Micropsylla* (gen. n.) *peromyscus*, from a white-footed mouse (*Peromyscus maniculatus artemisiae*) ; and *Ctenopsylla ravalliensis*, *C. bitterrootensis* and *Neopsylla hamiltoni*, from pack rats (*Neotoma cinerea*). A host index illustrates the species and comparative prevalence of the fleas found on the various wild animals.

Freeborn (S. B.). **The Range Overlapping of *Anopheles maculipennis*, Meig., and *Anopheles quadrimaculatus*, Say.**—*Bull. Brooklyn Ent. Soc.*, xviii, no. 5, pp. 157–158. Brooklyn, N.Y., December 1923.

Among a number of *Anopheles quadrimaculatus*, Say, collected in Massachusetts during October, the author found numerous individuals of *A. maculipennis*, Meig., which had not hitherto been reported on

the Atlantic coast further south than Maine. Although they overlap in range, each mosquito maintains its specific characters in a very distinct manner. As there has been much confusion regarding these two important malaria carriers, their systematic position and synonyms are discussed.

CRAWLEY (H.). *Cuterebra cuniculi* **in the Dog (Diptera : Oestridae).**— *Ent. News.*, xxxiv, no. 10, p. 315. Philadephia, Pa., December 1923.

A larva of *Cuterebra cuniculi*, Clk., was taken from under the skin a dog in Philadelphia. It is supposed that it had been ingested with food and had passed through the tissues to the skin.

DYAR (H. G.). **The Mosquitoes of Panama (Diptera, Culicidae).**— *Insecutor Inscitiae Menstruus*, xi, no. 10–12, pp. 167–186. Washington, D.C., October–December 1923.

This list includes about 130 species with notes on the synonymy.

DYAR (H. G.). **A new** *Culex* **from Mexico (Diptera, Culicidae).**— *Insecutor Inscitiae Menstruus*, xi, no. 10–12, pp. 186–187. Washington, D.C., October–December 1923.

Culex federalis, sp. n., is described from Mexico. The description is based on the male genitalia, as the condition of the available specimens is too poor for further characters to be recorded.

DYAR (H. G.). **On some of the American Subgenera of** *Culex* **(Diptera, Culicidae).**— *Insecutor Inscitiae Menstruus*, xi, no. 10–12, pp. 187–190, 2 pls. Washington, D.C., October–December 1923.

A further study of more extensive material [*cf. R.A.E.*, B, vi, 142] has necessitated a regrouping of the subgenera of *Culex*. Notes on some of the species are also given.

HEYDON (G. M.). **Malaria at Rabaul.**—*Health*, i, no. 9, pp. 249–254, 4 figs. Melbourne, November 1923.

A survey has been made of malaria conditions in Rabaul, New Britain. The three classical types of malaria are all endemic there, but the epidemic form has not been met with. The vector is *Anopheles punctulatus*, Dön., of which var. *moluccensis*, Sw., is the common form, though another variety also occurs. *A. punctulatus* breeds generally in natural fresh surface waters, but not in artificial containers, nor in collections of water in leaves, etc. Adequate drainage along the shore line, and suitable treatment of surface wells and of one or two small streams near the foot of the hills should bring the breeding places under control at small expenditure.

HURWOOD (A. S.). **Some Observations on the Use of Oil as a Larvicide.** —*Health*, i, no. 9, pp. 255–259, 2 figs. Melbourne, November 1923.

As a film of kerosene soon evaporates in the hot, dry climate of Australia, an attempt has been made to find some oil with a more durable film for use against mosquito larvae. A number of oils were tested, each being sprayed at the rate of ½ oz. to the square yard on water containing larvae and pupae of *Culex fatigans*. The results are summarised as follows :—

A mixture of 70 parts of kerosene and 30 parts of residual (fuel) oil constitutes the most efficient admixture of these oils for spraying mosquito larvae. Such a mixture is easily worked, and has no clogging effect on the spray. Also it costs less per unit volume than does kerosene, and produces a more durable film than does the latter.

The use of a higher proportion of residual (fuel) oil, up to 50 per cent., is well worth a trial under field conditions. Laboratory experiments indicate that in sheltered localities such an admixture would prove an efficient larvicide.

In open country, spraying with these oils would have to be carried out at least once a week in quantities of approximately 1 oz. to the square yard. In sheltered pools half this rate of spraying should be sufficient.

Phenolic tar oil and soap emulsions are very effective in killing mosquito larvae. Containing, however, scheduled poisons, they cannot be used generally, but in restricted areas should prove very efficient.

The addition of a small percentage of vegetable oil to kerosene improves its filming value and also increases the durability of the film. Thus in the spraying of tanks, such admixtures might in the long run prove more economical than kerosene.

It should be noted that these tests were carried out under laboratory and not under field conditions.

BORTHWICK (T.). **An Anti-mosquito Campaign in Adelaide.**—*Health*, i, no. 9, pp. 259–265, 1 fig. Melbourne, November 1923.

A 3-year campaign is being held in Adelaide for the eradication of mosquitos. The species present are *Anopheles* (*Nyssorhynchus*) *annulipes*, a malaria carrier, found in the lake and river, *Culex fatigans*, *Aëdes* (*Scutomyia*) *notoscriptus*, found in rainwater tanks, and *C. sitiens* (*annulirostris*), found in the river. The organisation of the campaign is described. A bye-law was passed giving powers to initiate the formal campaign, and compelling householders to deal systematically with all collections of water on their premises that are likely to harbour mosquito larvae. In addition, rain-water tanks were screened and the lake dealt with by the removal of marginal vegetation, by scattering oil-soaked sawdust on pools and by constructing decoy pools on the banks of the lake. Indigenous larvicidal fish, including *Melanotaenia nigrans*, *Priopis olivaceus* and *Carassiops galii*, are being bred in numbers to stock the water.

The results of the first year's campaign have been remarkably good and certain improvements are to be made in the plans for the next season.

How Ticks are killed when Cattle are dipped or sprayed.—*Farmers' Jl.*, v, no. 49, p. 20. Nairobi, 6th December 1923.

Experiments in dipping cattle with an arsenical dip in South Africa have shown that a brief but thorough immersion kills the ticks as effectively as a long one. If ticks are taken off cattle soon after dipping or spraying, and thoroughly cleaned, no trace of poison will be found in their bodies, but ticks similarly treated six days after dipping contain appreciable quantities of arsenic, proving that the poison is absorbed after the dipping or spraying is over. Among dips that contain equal amounts of poison those that spread over and thoroughly wet the whole surface of the skin of the animal possess the greater killing power ; dips that saturate the skin in patches kill only the ticks that adhere to those patches. Observations indicate that the living cells forming the deeper layers of the skin of animals have an actual affinity for arsenic, and the poison is arrested and fixed in them and thus prevented from reaching the circulating blood. If this theory is correct, after dipping or spraying the deeper layers of the skin will become strongly impregnated with arsenic. Consequently a tick, while feeding on an animal that has been recently dipped or sprayed, ingests considerable quantities of the poison with the blood and lymph that have passed through the deeper layers of the skin [*cf. R.A.E.*, B, iii, 218].

McCall (F. J.). **Annual Report of the Department of Veterinary Science and Animal Husbandry, Tanganyika, 1922.**—Fol., 30 pp., 1 map. London, Crown Agents for the Colonies. [1923.] Price 3*s.* 6*d.*

In the course of this report an account is given of the various diseases of animals that occurred during 1922 in Tanganyika ; these include trypanosomiasis of cattle ; and the recession of tsetse-flies in certain districts and their encroachment in others is discussed.

Extracts from the report of the veterinary pathologist of Mpapua Laboratory, H. E. Hornby, are appended, and include brief notes on the treatment of African coast fever. In this connection an attempt was made to obtain infected nymphs of *Rhipicephalus* by feeding the larvae on infected hosts. However the concentration of arsenic in the skin of the animals as a result of regular 7-day dipping was so great that the larvae fell off poisoned before they were engorged. These results indicate that regularly dipped cattle may be infected with the disease without acting as disseminators.

Our Live Stock and Ticks.—*Jl. Gold Coast Agric. & Comm. Soc.*, ii, no. 3–4, pp. 183–192, 18 figs. Accra, April–September 1923.

The illustrations omitted from an article by S. R. Rippon [*R.A.E.*, B, xi, 130] are here published with explanations,

ALLAN (W.). **Preventive Measures against Insect-borne Diseases.**—*Sierra Leone: Ann. Med. & Sanit. Rept. 1922*, pp. 23–24. Freetown, 1923. [Received 7th January 1924.]

Anti-mosquito measures were carried out on the usual lines. A single individual of *Anopheles umbrosus*, not previously known to occur in Freetown, was captured, but its origin was unknown.

BLACKLOCK (B.). **Preliminary Report on the Prevalence of the Tsetse-fly.**—*Sierra Leone: Ann. Med. & Sanit. Rept. 1922*, pp. 68–74. Freetown, 1923. [Received 7th January 1924].

In 1914–15 an investigation was carried out regarding the prevalence of *Glossina palpalis* in Cape Lighthouse Peninsula, Sierra Leone, during the dry season [*R.A.E.*, B, iii, 177, 179]. In 1922 a similar investigation was made during the wet season, and the results are compared. In 1914–15, of 400 flies, 19, or 4·7 per cent., were infected with trypanosomes, while in 1922, of 471 flies captured, 28, or 5·9 per cent., were infected. It would seem, therefore, that there is not much difference between the infective rate in the dry and wet season; it should be remembered, however, that partial clearing carried out after 1915 may have altered the proportion of infective flies. In both cases, proboscis infection predominated, the trypanosomes found belonging to the animal-infecting group, being in all probability *Trypanosoma congolense* and *T. vivax*. In 1914–15 no infection of the salivary glands was recorded, whereas in the present series one such infection was discovered, which may have been *T. gambiense*, especially as this trypanosome has once been found in cattle in Sierra Leone. From the dissections of wild flies, it would appear that conditions on Cape Lighthouse Peninsula at present preclude the possibility of successful maintenance of cattle in the area. A study of the habits of the fly in this region has shown that clearing the undergrowth would rapidly cause a check in fly-breeding. Ground-nuts, sweet potatoes, etc., are suggested as crops likely to give little protection to the fly. As many of the oil-palms (*Elaeis guineënsis*) on the peninsula are old and of little commercial value, it is suggested that some of these that obviously afford shelter to the fly should be cut down.

BORTHWICK (J. D.). **Report of the Veterinary Division [1922–23].**—*Jl. Dept. Agric. Union S. Africa*, vii, no. 6, pp. 521–527. Pretoria, December 1923.

The situation with regard to African coast fever is considered satisfactory in the Transvaal and the Transkeian territories, where improvements in dipping and regulation of movements of stock have resulted in considerable progress in the campaign against the disease. In Natal, however, little progress has been made, the most heavily infested areas being those in rough and remote parts of the Province, in valleys where the climate is favourable to ticks, and on farms mainly occupied by natives. The difficulties in applying efficient supervision of dipping and general control of the disease in such cases are considerable, but where regular dipping and hand-dressing was carried out, good results were obtained. No outbreaks of the disease occurred in Cape Province or the Orange Free State during the year.

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Ballou (H. A.). **Tropical Entomology.**—*Trop. Agriculture*, i, no. 1, pp. 5–6. Trinidad, January 1924.

The importance of recent discoveries regarding the relations between insects and disease, and the value of this knowledge in opening up previously uninhabitable regions in the tropics, is discussed.

Gilmer (P. M.). **The Poison and Poison Apparatus of the White-marked Tussock Moth,** *Hemerocampa leucostigma*, **Smith & Abbot.**—*Jl. Parasit.*, x, no. 2, pp. 80–86, 2 figs., 2 pls. Urbana, Ill., December 1923.

In this study of the poisonous properties of the larval hairs of *Hemerocampa leucostigma* (white-marked tussock moth), experiments showed that the urtication caused by them is not due to mechanical irritation. The poisonous effect is due to the smaller white hairs, scattered all over the body of the larva, but chiefly on the lateral tubercles and on the dorsal plume tubercles of the first thoracic and last abdominal segments in the first two instars. They are particularly localised in the dorsal white tufts on the first four abdominal segments in the later instars. The point of entry in the human skin was invariably found to be the hair follicles; efforts to force the hairs into the skin elsewhere resulted in breaking them without effecting entry. The hairs retain their virulence after being shed, both in the cocoons and in the shed larval skins. The poison is very resistant to chemicals, being insoluble in all ordinary solvents. The virulence is increased by acids and decreased by alkalis of low concentration. It is resistant to both moist and dry heat. The poisonous properties are closely associated with the remnants of dried protoplasm in the shed larval hairs, and this must be dissolved before the hairs are innocuous. Complete oxidisation was obtained by the use of dilute potassium permanganate, and by very dilute solutions of potassium bichromate and sulphuric acid. The poison is the product of a special gland cell communicating directly with the hair and independent of the hair-forming cell.

Sandground (J. H.). "*Oxyuris incognita*" **or** *Heterodera radicicola*. —*Jl. Parasit.*, x, no. 2, pp. 92–94, 4 figs. Urbana, Ill., December 1923.

The author is now convinced that Nematode eggs that were found to have passed through the human alimentary tract and that resembled those of Oxyurids are those of *Heterodera radicicola*.

Matheson (R.). **Notes on Culicidae** (*Aëdes*).—*Insecutor Inscitiae Menstruus*, xii, no. 1–3, pp. 22–24. Washington, D.C., January 1924.

After an examination of larvae and adults of *Aëdes abserratus*, F. & Y., the author differs from Dyar in treating it as a synonym of *A. punctor*, Kirby (*auroides*, Felt); he considers it a distinct species, and that *A. dysanor*, Dyar [*R. A. E.*, B, ix, 88] is a synonym of it.

Dyar (H. G.). **Note on** *Aëdes punctor* **Kirby (Diptera, Culicidae).**— *Insecutor Inscitiae Menstruus*, xii, no. 1–3, pp. 24–26. Washington, D.C., January 1924.

The author discusses the species dealt with in the previous paper and a number of others, as a result of which he gives the following synonymy : *Aëdes punctor*, Kirby (*provocans*, Wlk., *auroides*, Felt) ; *A. implacabilis*, Wlk. (*abserratus*, F. & Y., *centrotus*, H., D. & K., *dysanor*, Dyar).

Freeborn (S. B.). **The " Proepimera " of the Culicidae.**— *Insecutor Inscitiae Menstruus*, xii, no. 1–3, pp. 37–38, 1 pl. Washington, D.C., January 1924.

Owing to the taxonomic value of the characters of the prothorax of mosquitos, attention is drawn to an error in the terms applied to this part of the body. According to G. C. Crampton, the so-called proepimeron of mosquitos is in reality a pronotal structure, and this view is supported by the observations here described.

Dyar (H. G.). **The Mosquitoes of Colorado (Diptera, Culicidae).**— *Insecutor Inscitiae Menstruus*, xii, no. 1–3, pp. 39–46. Washington, D.C., January 1924.

A list is given of the mosquitos occurring in Colorado with notes and, in some cases, remarks on their breeding places.

The Canadian fauna follows the mountain crests into Wyoming, and extends into Colorado along a level of 7,000 feet, but not much below that.

Dyar (H. G.) & Shannon (R. C.). **New** *Culex* **from Panama (Diptera, Culicidae).**— *Insecutor Inscitiae Menstruus*, xii, no. 1–3, pp. 46–48. Washington, D.C., January 1924.

The new species described from Panama are *Culex* (*Choeroporpa*) *dornarum*, *C.* (*C.*) *fatuator* and *C.* (*C.*) *cuclyx*. *C.* (*C.*) *conspirator*, D. & K., is also recorded from Panama.

Bull (C. G.) & King (W. V.). **The Identification of the Blood Meal of Mosquitoes by means of the Precipitin Test.**— *Amer. Jl. Hygiene*, iii, no. 5, pp. 491–496. Baltimore, Md., September 1923.

An abridged form of this paper has already been noticed [*R. A.E.*, B, xi, 207].

King (W. V.) & Bull (C. G.). **The Blood-feeding Habits of Malaria-carrying Mosquitoes.**— *Amer. Jl. Hygiene*, iii, no. 5, pp. 497–513. Baltimore, Md., September 1923. [Received 24th January 1924.]

A study has been made of the malaria-carrying mosquitos on the cotton plantations in Louisiana, and the results of testing a large number of *Anopheles* (chiefly *A. quadrimaculatus*) by means of the precipitin method [see preceding paper] are described at greater length than previously [*R. A.E.*, B, xi, 207]. The percentages obtained for the different hosts varied with each plantation and with the various places in which the mosquitos were collected (inside and under the

house, in out-buildings, etc.). The averages applying to the whole population of *A. quadrimaculatus* and based on collections throughout the season from 41 houses are: cow, 35·7 per cent., horse 32·6, pig 16·1, dog 8·3, man 4·3 and other animals (chickens and cats) 3 per cent. It was found that the proportion that fed on man appeared to decrease as the abundance of mosquitos increased. The effect of eliminating part of the mosquito population by screening houses was counteracted by the fact that a much larger proportion fed on man than in unscreened ones.

A few individuals of *A. punctipennis* and of *A. crucians* were also obtained for the precipitin tests, and the results indicated a possible difference in their blood-feeding habits, since none of the former had fed on man, while 6 out of 125 of the latter were found to contain human blood. The dissection and examination of a large number of *Anopheles* has shown that only a very small proportion contained the sporozoite or infective stage of the malaria parasite (slightly more than 1 per 1,000), and this raised the question of the relative importance of mosquito-borne infections and relapses in the occurrence of malaria. It was estimated, however, that from the average number of bites per person, a malaria rate of over 45 per cent. due to new infections alone was to be expected, even with such a low sporozoite rate.

Wehr (E. E.). **A Synopsis of the Tabanidae of Nebraska, with a Description of a new Species from Colorado.**— *Univ. Studies*, xxii, nos. 3 & 4, pp. 107–118. Lincoln, Neb., July & October 1922; also as *Dept. Ent. Contrib.*, 29, 12 pp., Lincoln, Neb., January 1924.

This synopsis of the Tabanids of Nebraska is probably a complete list of the known species. Hine's classification is followed in the main, and keys are given to the 9 North American genera and to the species of the 3 genera found in Nebraska, namely, *Silvius*, *Chrysops* and *Tabanus*. *Silvius microcephalus*, sp.n., is described from Colorado.

Aldrich (J. M.). **The Genus** *Philornis*. **A Bird-infesting Group of Anthomyiidae.**— *Ann. Ent. Soc. Amer.*, xvi, no. 4, pp. 304–309, 1 fig. Columbus, Ohio, December 1923.

Previous literature concerning the Anthomyiid genus, *Philornis*, is reviewed, and its systematic position is discussed. The species examined, all of which infest birds, are *P. pici*, Macq., from Santo Domingo; *P. angustifrons*, Lw., from Costa Rica and British Guiana; and *P. obscura*, Wulp, from Texas and Peru. A key is given to both sexes of these flies.

Barnes (H. F.). **Some Facts about** *Pollenia rudis*, **Fabr.**— *Vasculum*, x, no. 2, pp. 34–38. Newcastle-upon-Tyne, January 1924.

The life-cycle of *Pollenia rudis*, F., is described. This fly infests earthworms of the genus *Allolobophora* but not apparently *Lumbricus herculeus*. The author concludes that *P. rudis* may hibernate as an adult, and that the eggs are then laid in April. Fertilisation takes place before hibernation, although the males do survive the winter. The presence of worms in the soil is necessary for oviposition. The eggs are laid in crevices in the soil, usually singly.

PARKER (H. L.). **Contribution à la connaissance de** *Chalcis fonscolombei*, **Dufour (Hym.).**—*Bull. Soc. ent. France*, 1923, no. 18, pp. 238–240. Paris, 1923.

The Hymenopterous parasite, *Chalcis fonscolombei*, Duf., has been reared from various species of Sarcophagids living in the larval state in decomposing meat. It has also been recorded from *Lucilia*, but the author has been unable to rear it from, or induce oviposition in, this host. The larger larvae of Sarcophagids are generally attacked, and the parasitic larva develops in the body of the host for about 20 to 25 days, the host pupating in spite of the presence of the parasite. The parasite passes the winter in the larval stage and pupates in the spring within the host puparium.

LINDNER (E.). **Diptera.**—*Biol. Tiere Deutschlands*, Teil 38, pp. 1–40, 36 figs. Berlin, 15th June 1923. [Received 28th January 1924.]

This is a section of a general treatise on the biology of the fauna of Germany [*R.A.E.*, B, xi, 72]. The salient points of interest in the morphology, development and habits of Diptera are illustrated by references to various species, including some that are of agricultural and medical importance.

MORRIS (L. M.). **Phlebotomus Fever in the Eastern Mediterranean during the War, with special reference to its Prevention.**—*Jl. R.N. Med. Service*, ix, no. 4, pp. 286–289. London, October 1923.

A study of *Phlebotomus* and of sandfly fever occurring at various camps in East Mudros showed that the fever always occurred in camps placed near a flat foreshore, where the soil is friable and the subsoil drainage poor. In a camp on such soil the ground becomes fouled and disturbed and forms a suitable breeding-place for *Phlebotomus*, which prefers damp, dark crevices in soil, sullage-pits, drains, etc., or in the old woodwork of piers and huts, especially near sea level. If camps cannot be removed from such a site, all huts should be well raised from the ground to allow for ventilation and drying, and the soil exposed to sun and wind as far as possible. The ground underneath should be levelled and sprayed with a mixture of crude oil and low grade paraffin at least once a week. All rubble, old store dumps, disused canvas and woodwork should be cleared away from the vicinity. Camp sanitation and inspection, disinfection of drains, soakage pits, etc., with C. fluid or strong cresol, and daily burning and destruction of all refuse is essential. Huts, especially when used for the sick, may be sprayed with 1 per cent. formalin solution, and dug-outs disinfected with sulphur. Mosquito nets are useless, and sandfly nets are too closely meshed to admit circulation of air.

LAMBERT (J.). **Phlebotomus Fever.**—*Jl. R.N. Med. Service*, ix, no. 4; pp. 289–297, x, no 1, pp. 24–31, 12 charts. London, October 1923 and January 1924.

This paper deals especially with the clinical aspect and treatment of sandfly fever at Lemnos, where it has existed for the past three years. The conditions under which the inhabitants live offer ideal breeding places for *Phlebotomus papatasii*, which is the commonest species. The lesions produced by *Phlebotomus* are described; the effect of the bite varies under different circumstances, the parts attacked being generally those that are least protected during sleep.

HIGGINS (J. T. D. S.). **Note on Cases of Phlebotomus Fever at an Island in the Eastern Mediterranean.**—*Jl. R.N. Med. Service*, x, no. 1, pp. 31–34. London, January 1924.

Eight cases of sandfly fever are discussed, all of which were due to infection by *Phlebotomus papatasii*. Six of the cases occurred in one house, and the men sleeping on the ground-floor were moved to a floor above, while the likely breeding-places outside the building were cleared and covered with lime. After these measures were taken no further cases were reported, but this fact was probably partly due to a change of weather conditions.

WHITTINGHAM (H. E.) & ROOK (A. F.). **The Prevention of Phlebotomus Fever.**—*Trans. R. Soc. Trop. Med. & Hyg.*, xvii, no. 5, pp. 290–330, 10 charts, 8 pls. London, January 1924.

Sandfly fever is conveyed to man by *Phlebotomus* spp., usually *P. papatasii*, the virus being either inherited or acquired by the larvae in the breeding grounds [*cf. R.A.E.*, B, xii, 24].

The invasion of buildings in Malta generally occurs between sunset and dawn, the midges entering by windows, doors, ventilators, etc. They are attracted to the buildings by the odour of man, upon whom the females at once proceed to feed. The males collect near the ceiling, where they are generally followed by the females after they have fed. Some of the females escape through the various apertures in the wall and retire to the breeding grounds. Those remaining in the building are able to bite again after intervals of from 1 to 5 days, depending on such factors as atmospheric temperature, humidity, pregnancy and the amount of blood ingested at a previous feed. Some individuals feed only twice during their life, but others will take as many as 12 meals. After about 5 to 14 days the eggs are laid in the building or outside. Whether they lay eggs or not, the females die within 14 days. Following a careful study of the life-history and habits of these midges systematic measures for their destruction were undertaken in Malta, and these are described in detail. They should be carried out under two main headings, those that are the duty of the community as a whole and those to be carried out by the individual. All areas should be inspected at the end of the rainy season, special attention being paid to the ground surface as regards levelling, impermeability and drainage, and to all houses and walls with a view to sealing up any cracks or holes and mending fly-proof screens, etc. These repairs should all be done before the warm weather sets in. Each year the interior of rooms should be washed down and painted or lime-washed. The lower three feet of the walls of all buildings should be tarred and the ground surface sprayed with tar for a distance of twenty feet beyond the living quarters. This latter precaution is not necessary where the ground around the building is covered with concrete. Inside the building all rooms, corners, ventilators, gulley traps, etc., must be kept thoroughly clean and free from cobwebs and rubbish. All the midges in the rooms must be destroyed by swatting or spraying with a 1 per cent. solution of cresol. Repellents such as camphor should be used in the beds, which should be surrounded by sandfly nets of 45 meshes to the inch. Natural air currents should be fully utilised, and a liberal supply of electric fans or punkhas provided.

The application of these measures reduced the incidence of sandfly fever in Malta by half in 1922, as compared with the preceding two years.

FLETCHER (T. B.). **Pathological Entomology.**—*Sci. Repts. Agric. Res. Inst., Pusa, 1922–23*, pp. 65–68. Calcutta, 1923. [Received 4th February 1924.]

Life-history studies of *Tabanus albimedius*, Wlk., have been made, and it has been found that there are seven larval instars; the larva of this species seems to suck its prey, although it possesses mandibles. Larvae of another Tabanid, *Gastroxides ater*, Saund., were collected from tree-holes between November and January, the first adult emerging on 21st June.

Aëdes (*Stegomyia*) *albopictus*, Skuse, *A.* (*S.*) *thomsoni*, Theo., *A.* (*S.*) *w-alba*, Theo., *A.* (*Finlaya*) *lophoventralis*, Theo., *Armigeres obturbans*, Wlk., *Culex fatigans*, Wied., and *C. brevipalpis*, Giles, were found breeding in bamboo traps; *Anopheles fuliginosus*, Giles, *A. culicifacies*, Giles, and *Culex bitaeniorhynchus*, Giles, were found breeding freely in a river. A rare mosquito in Pusa, *Uranotaenia campestris*, Leic., was found breeding in a tank in October. A Hippoboscid fly, observed for the first time (perhaps a species of *Ornithomyia*) was collected in some numbers, both adults and puparia, in nests of the Indian sand-martin (*Riparia brevicaudata*). Further cases of human myiasis caused by the Calliphorine, *Chrysomyia bezziana*, Vill., have been recorded, especially from North Bihar. This is a common cause of myiasis in domestic animals. The larvae are found fairly frequently, but the adults are rarely seen flying under natural conditions.

WATSON (M.). **The Control of Malaria.**—*Jl. Trop. Med. & Hyg.*, xxvii, no. 1, pp. 6–7. London, 1st January 1924.

This paper is written as a tribute to Sir Ronald Ross on the 25th anniversary of his great discovery, and gives two examples of what has been done to control malaria in the Malay Peninsula in the past 20 years under different physical conditions.

BARNES (M. E.). **Anopheline Mosquitoes, with special reference to the Species found in Siam.**—*Jl. Nat. Hist. Soc. Siam*, vi, no. 1, pp. 65–79, 1 pl. Bangkok, 25th May 1923.

A key is given to the seventeen species of Anopheline mosquitos found in Siam, with a list showing their distribution [*R. A. E.*, B, xi, 205].

MANGKOEWINOTO (R. M. M.). **Sanitation of the Tjihea-Plain.**—*Repts. Dutch-Indian Med. Civil Service*, 1923, no. 3, pp. 236–274, 1 fig., 2 pls. Batavia, 1923.

Before the Tjisokan irrigation works were finished in 1904, the greater part of the Tjihea plain in West Java was dry and barren. There are now about 14,000 acres of rice-fields. Malaria had occurred previously, but injudicious irrigation has not only decreased the fertility of the rice-fields, but has led to severe epidemics of malaria. In 1912

Anopheles minimus aconitus, Dön. (*albirostris*, Theo.) was considered to be probably responsible for the malaria present, and in 1917 it was found to represent about 80 per cent. of the total taken indoors. Very few were taken in the evening, but during the day large numbers were found. They probably enter late at night or early in the morning and have gone out by the evening. *A. minimus aconitus* does not bite during the day. Its flying radius is less than that of *A. ludlowi*, Theo., the greatest distance at which marked individuals were recaptured in experiments in 1919 being about 380 yards. The larvae (all of about 5,000 examined being of the typical form) were found in the flooded fallow rice-fields and in ditches (even with fast-running water) with a luxuriant border of grass overhanging the water. In 1919 when many fields were dry, these larvae predominated in the ditches between the fields. In fields planted with rice, few larvae of *A. minimus aconitus* were noticed, only *A. hyrcanus*, Pall. (*sinensis*, Wied.), *A. barbirostris*, Wulp, etc., being normally found. *A. subpictus*, Grassi, (*rossi*, Giles) was abundant in 1917, scarce in 1919, and has now disappeared almost entirely, although suitable breeding places still exist. *A. vagus*, Dön. (*indefinitus*, Ludl.) is now rather common.

The practical recommendations based on the above observations were: Making absolutely dry the fallow rice-fields and the planted fields after the rice has been harvested; planting the fields simultaneously; cleaning the ditches containing water; and quinine prophylaxis when acute recrudescences of the epidemic appear. In May and June 1922, after sanitation work had been applied for over 2 years, malaria had perceptibly decreased. The annual cost to the State is about 42 cents. (about 9*d*. at par) per head of the population of 13,605.

Experiments to determine the attractiveness of buffalos for *A. minimus aconitus* show that it is very variable. Probably individuals from one breeding-place are more strongly attracted by a buffalo than those of the same species from another.

Otten (L.). **The Way in which Plague spreads over Java.**—*Repts. Dutch-Indian Med. Civil Service*, 1923, no. 3, pp. 278–292, 3 maps; also in *Geneesk. Tijdschr. Ned.-Indië*, lxiii, no. 6, pp. 970–990, 3 maps. Batavia, 1923.

According to van Steenis the spread of plague in Java is not due to the house-rat, *Mus rattus griseiventer*, in view of its non-migratory habits. The carriage in bundles, etc., of house-rats or fleas is also relatively unimportant, and in hilly districts the field-rat, *Mus rattus diardii*, in conjunction with *Pygiopsylla ahalae*, is chiefly responsible.

The author discusses this view, but is still of opinion that infection is carried everywhere by human agency. He considers that little or no importance attaches to the rats (*M. concolor* and *M. rattus diardii*) that harbour *P. ahalae*.

Heydon (G. A. M.). **Malaria at Rabaul.**—*Med. Jl. Australia*, 10th Yr., ii, no. 24, pp. 625–633, 5 figs. Sydney, 15th December 1923.

This information has already been noticed from another source [*R.A.E.*, B, xii, 38], the subject being dealt with at greater length in the present paper.

[Palestine.] **Proceedings of the 8th Meeting of the Antimalarial Advisory Commission, 22nd November 1923.**—14 pp. multigraph. [Received 24th January 1924.]

Eight species of *Anopheles* have been found to occur in Palestine, six of which visit houses and are consequently potential malaria carriers. Experimental infection of mosquitos indicates that *A. elutus* is a carrier of malignant tertian parasites, and that neither *A. elutus* nor *A. sergenti* are infected by a single feed on patients that have received quinine within 48 hours previously. Dissections of mosquitos in nature show one individual of *A. elutus* out of 75 to have developed cysts, while 175 of *A. sergenti* were all free from infection. *A. elutus* may therefore be considered an important carrier of malaria in Palestine. It breeds throughout the year, though its maximum numbers are reached in the early summer months; *A. sergenti* appeared in July and remained to the end of the year.

Very encouraging results have been obtained with Paris green as a mosquito larvicide, following Barber's method [*R.A.E.*, B, x, 66].

Arndt (W.). **Bemerkungen über die Rolle der Insekten im Arzneischatz der alten Kulturvölker.** [Remarks on the Rôle of Insects in the Pharmacology of ancient Civilisations.]—*Deutsche Ent. Zeitschr.*, 1923, pt. 6, pp. 553–570, 3 figs. Berlin, 15th December 1923.

The available records of the use of insects in medicine are reviewed, the information being grouped under the different countries.

Imes (M.). **Hog Lice and Hog Mange. Methods of Control and Eradication.**—*U.S. Dept. Agric.*, Farmers' Bull. 1085, 28 pp., 11 figs. Washington, D.C., September 1923. [Received 5th February 1924.]

This is a second revision of a bulletin previously noticed [*R.A.E.*, B, viii, 200].

Séguy (E.). **Les Insectes parasites de l'homme et des animaux domestiques.**—12mo, 422 pp., 463 figs. Paris, Paul Lechevalier, 1924. Price Fr. 30.

This work has been compiled for use as a reference book, and gives an account of the common insect parasites of man and domestic animals and of their relations with their hosts. Many of the text figures and detailed descriptions are taken from the author's own observations, and comprehensive indices are included.

Marcq (J.). **Un Voyage d'études zootechniques au Congo oriental.**—*Ann. Gembloux*, xxx, pt. 1, pp. 1–40. Brussels, January 1924.

In the course of this survey of the Eastern Congo, the various diseases affecting domestic animals are briefly discussed. These include bovine piroplamosis, caused by *Piroplasma bigeminum*, and African coast fever, caused by *Theileria parva*, in connection with which the importance of protecting stock from infection and of the destruction of parasites is pointed out. The most common tick in Ruanda is *Rhipicephalus appendiculatus*.

PEARSON (A.) & MOUCHET (R.). **The Practical Hygiene of Native Compounds in Tropical Africa.**—4to, xiv + 188 pp., 44 pls. London, Baillière, Tindall & Cox, 1923. Price 22*s.* 6*d.* net.

This book presents the result of personal observation derived from eighteen years' experience in dealing with the sanitation of native compounds in Katanga, Belgian Congo. Hitherto no work has been published covering the same ground, and as the methods and installations described could be adopted almost anywhere in Tropical Africa, while the principles on which they are based are of universal application, the information here given should prove of the greatest value. The first section of the book is devoted to compound hygiene, and the second to epidemics and pathology.

The authors consider that the two chief causes of mortality in the Katanga compounds are pneumonia and flies, and the chapters dealing with the arrangement of compounds, latrine arrangements and sewage disposal, and the maintenance of cleanliness should prove of great interest to the medical entomologist in the latter connection. The methods recommended are described in detail and clearly illustrated, and their respective advantages for different circumstances are given.

Though fly-borne dysentery was the most serious of the insect-borne diseases met with, considerable loss in labour efficiency was constantly caused by tropical ulcers, the presence of flies in abundance being a most important factor in the conveyance of infection. Relapsing (tick) fever, due to *Ornithodorus moubata*, was also the cause of a large amount of sickness (though the mortality was low) where the natives belonged to races that were not immune. It was, however, preventable with huts of proper construction, if they could be kept clean, or with grass huts destroyed and renewed each year. This is also a protection to a great extent from various insect parasites. Malaria was never the cause of any serious trouble.

The authors also devote careful consideration to the effect of race on the susceptibility of the various natives to disease, and to that of their conditions of life before and after they come to the compounds.

RODHAIN (J.). **Sur la réceptivité des roussettes épaulières,** *Epomophorus wahlbergi haldemani* **Hallowell et** *Micropteropus pusillus* **Peters au** *Spirochaeta duttoni* **Todd.**—*Bull. Soc. Path. exot.*, xvi, no. 10, pp. 729–733. Paris, 1923.

Experiments with *Epomophorus wahlbergi haldemani* and *Micropteropus pusillus* show that these bats are very susceptible to *Spirochaeta duttoni*, even slightly more so than white mice.

CHALON (G.). **Présence d'***Ornithodoros savignyi* **(Audouin) à Ouargla (Sahara algérien).**—*Bull. Soc. Path. exot.*, xvi, no. 10, pp. 741–742. Paris, 1923.

Ornithodorus savignyi, Aud., is recorded from Wargla, where it has apparently been known to the natives for some time, but is not considered of great importance. It is chiefly a parasite of camels, but will occasionally attack man.

Schulze (P.). *Haemaphysalis concinna* **Koch (Ixod.) in Brandenburg.** —*Deutsche Ent. Zeitschr.*, 1923, pt. 6, p. 612. Berlin, 15th December 1923.

Haemaphysalis concinna, Koch, is recorded from Brandenburg.

Toldt (K.). **Ueber eine herbstliche Milbenplage in den Alpen.** [An autumnal Plague of Mites in the Alps.]—*Veröffentlichungen Mus. Ferdinandeum*, no. 3, 35 pp., 8 pls. Innsbruck, 1923.

This is a detailed account of the autumn outbreaks in the Dolomites of the South Tyrol of the larval mite, *Leptus autumnalis*, Shaw, which, when adult, is known as *Microtrombidium pusillum*, Herm. *L. autumnalis* is generally found in localities such as meadows, facing south or west, and always at an altitude above 3,400 feet. In the literature it is stated that these mites are most troublesome in summer and autumn months that are dry, but on fine days in the wet year 1922 the author found the mites to be as plentiful as during the dry year 1921. Most of the records of infestation relate to man and birds, but it has also been noticed in sheep and goats.

Hirst (S.). **On some New or Little-known Species of Acari.**—*Proc. Zool. Soc. Lond.*, 1923, pt. 4, pp. 971–1000, 24 figs. London, December 1923.

Among the many species dealt with *Liponyssus sylviarum*, C. & F., is recorded for the first time as a pest of poultry from England; and *Demodex sciurinus*, sp. n., taken on a squirrel (*Sciurus vulgaris*), is described from Scotland.

Edwards (F. W.). **British Mosquitoes, 1920-23.**—*Entomologist*, lvii, no. 729, pp. 25–29. London, February 1924.

Since the publication of Lang's handbook of British mosquitos [*R.A.E.*, B, viii, 139], several additional species have been recorded, and notable advances have been made in the knowledge concerning them. A complete list of the British mosquitos at present known is given, and reference is made to various recent publications that should be of use to students of this subject.

Notes are given on the following species: *Anopheles plumbeus*, Steph., *Aëdes caspius*, Pall., *A. lutescens*, F., *A. communis*, DeG., *A. salinellus*, Edw., *A. punctor*, Kirby, *A. sticticus*, Mg., *Theobaldia annulata* var. *subochrea*, Edw., *T. alaskaensis*, Ludl., *T. morsitans*, Theo., and *Orthopodomyia pulchripalpis*, Rond.

Aëdes argenteus, Poir. (*Stegomyia fasciata*, F.) is omitted from the list as the author considers that its occurrence in a tree-hole in Epping Forest [*R.A.E.*, B, viii, 13] must have been accidental.

Legendre (J.). **Des variations dans le trophisme des Culicides.**—*C. R. hebdom. Acad. Sci.*, clxxviii, no. 4, pp. 423–425. Paris, 1924.

Certain mosquitos attack only man, others only animals, but occasionally they are found to change their habits, for example, *Aëdes* (*Stegomyia*) *argenteus* (*fasciatus*) sometimes attacks animals, and may be fed on animal blood in captivity, and *Anopheles maculipennis*, which prefers rabbits, will attack man in the absence of these animals.

Anopheles (*Cellia*) *squamosus* and *A.* (*C.*) *pharoensis*, which feed on human blood, have been known to infest stables and attack horses. At Pons (Charente-Inférieure) in September and October 1921, *Culex pipiens* and *C. hortensis* were found attacking man, while from June to November 1923, in the same place and in similar circumstances, they did not do so, though there was no apparent modification in the local conditions.

GRASSI (B.). **Razze biologiche differenti di** *Culex pipiens*. [Different biological Races of *C. pipiens*.]—*Atti R. Accad. Naz. Lincei*, Rend., Class esci. fis., mat., e nat., xxxii, no. 12, pp. 457–464. Rome, 16th December 1923.

Females of *Culex* are supposed to be short-lived and to die soon after a mass-oviposition, continuation of the species being ensured by a rapid succession of generations during the hot months. In the genus *Aëdes* the eggs are laid in groups at intervals, and the females may live for months. If these are facts, it is remarkable that *Culex pipiens* can transmit avian malaria. In previous successful experiments the author used *C. pipiens* bred in cages, and therefore probably non-fertilised, and which probably engorged repeatedly, but did not oviposit. It is, therefore, possible that avian malaria is spread only by unfertilised mosquitos. In further experiments some captured females, which had already been fertilised and had engorged, oviposited in three days, but would not feed afterwards and soon died. Of others that had not engorged before capture, a few fed on sparrows before ovipositing. Those that survived, however, would not bite again. In cases where they had fed on infected sparrows, they harboured amphionts in the intestinal walls. Tests were then made with unfertilised bred females, but only a minority could be made to feed. They digested the blood without maturing their eggs and refused a second meal. If the sparrows on which they had fed were infected, they were also found to harbour amphionts. In one instance a laboratory female that fed once only on an infected sparrow was found with immature eggs, empty spermathecae and salivary glands full of sporozoites. This indicates the probability that non-fertilised Anophelines may behave similarly and that if prevented from issuing into the open air, they may succeed in transmitting infection. Further experiments were then made with *C. pipiens* caught in localities where they are very troublesome to man. These specimens were light-coloured (whereas those used before were darker), and nearly all were engorged. After 3-4 days they oviposited. Many survived, fed again and oviposited again. Some specimens oviposited 4 times between 19th September and 20th October. Those still alive then engorged again and were capable of ovipositing. This is not apparently true, however, of all light-coloured individuals of *C. pipiens*.

The author's conclusions are that some specimens of *C. pipiens* feed once and oviposit once ; that others feed repeatedly and oviposit repeatedly ; that some individuals probably never suck blood ; and that no data exist for assuming that some individuals prefer the blood of sparrows to that of man.

The problem of the preferred food of mosquitos is far more complex than supposed by Roubaud and Legendre, and much research is still necessary before domestic animals can be used (if at all) in anti-malarial work.

NITZULESCU (V.). **Sur l'ingestion du bleu de méthylène par** *Stomoxys calcitrans.*—*C. R. Soc. Biol.*, xc, no. 2, pp. 155–156. Paris, 1924.

The author was astonished to find that 30 per cent. of the flies found in the dispensaries at Jassy were *Stomoxys calcitrans*. *S. calcitrans* is not exclusively a blood-sucking species, but also ingests water, which it will readily take from a shallow dish. Many individuals were found dead around a plate of sugar water containing Fowler's solution [a solution of potassium arsenite], prepared for the poisoning of *Musca domestica*. In the experiments described both *S. calcitrans* and *M. domestica* also died as a result of ingesting water containing a concentrated solution of methylene blue.

POPOFF (P.). **Some Notes on Medical Conditions in Transcaucasia.**—*Jl. Trop. Med. & Hyg.*, xxvii, no. 2, pp. 13–14. London, 15th January 1924.

An account is given of the situation in Armenia when anti-malarial work was begun in 1923. The topography of the country is described. During 1918-22, when cereals were unobtainable from Russia, cotton cultivation practically ceased, and much of the cotton land was planted with rice. This is grown in Armenia by wet methods, and the fields are swamps throughout the summer, with the result that malaria has increased enormously. The cultivation of rice has now been forbidden on land near villages, roads and railways.

The Anophelines captured were *Anopheles maculipennis*, Mg. (*claviger*, F.), *A. bifurcatus*, L. (extremely rare), *A. plumbeus*, Hal. (also rare), *A. hyrcanus*, Pall. (*pseudopictus*, Grassi), and an occasional *A. superpictus*, Grassi. Many cases of sandfly fever have been recorded, and *Phlebotomus papatasii*, Scop., *P. perniciosus*, Newst., and *P. minutus*, Rond., all occur. *Simulium reptans*, L., has also been found.

WEIGL (R.). **Further Studies on** *Rickettsia rocha-limae.*—*Jl. Trop. Med. & Hyg.*, xxvii, no. 2, pp. 14–15. London, 15th January 1924.

Rickettsia rocha-limae, which was discovered to be infecting lice, is considered to be non-pathogenic to them. The main features distinguishing it from *R. prowazeki* are described, and the author explains a practical method that he has worked out for differentiating the two species.

ABE (T.). **Zur Frage der Fleckfieberätiologie.** [On the Question of the Aetiology of Typhus.]—*Centralbl. Bakt. Paras. Infekt.*, Ite Abt. Orig., xci, no. 3–4, pp. 217–227. Jena, 14th January 1924.

From certain of the experiments here described it appears that some development of *Rickettsia prowazeki* occurs in lice [*Pediculus humanus*] ; that the virus from the louse that is feeding enters the host ; and that the Weil-Felix reaction, which is positive in nearly 100 per cent. of typhus cases, is based on the occurrence of *R. prowazeki*.

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Gomes (E.). **Sobre a transmissão da lepra pelos mosquitos.** [On the Transmission of Leprosy by Mosquitos.]—*Brazil-Medico*, xxxvii (2), no. 26, pp. 379–381. Rio de Janeiro, 29th December 1923.

This is a brief review of various observations recorded in the literature on mosquitos in relation to leprosy.

In 1886 Leloir considered the transmission of leprosy by mosquitos to be possible, and Arning stated that the appearance of this disease in Hawaii coincided with that of mosquitos. Blanchard and others have recorded that leprosy occurs only in countries where mosquitos occur. Jeanselme has suggested the possibility of mosquito transmission in New Caledonia [*cf.* also *R. A. E.*, B, i, 35]. The author points out that a leper disseminating thousands of bacilli in excreta and secretions of ulcers often fails to infect those around him, and at the Leper Hospital of Rio de Janeiro he observed that mosquitos harbouring the leprosy bacillus were capable of biting. In conclusion, it is pointed out that leprosy attacks persons who have not been in contact with lepers, and that rigorous disinfection without anti-mosquito measures being taken fails to protect persons in the same house as a completely isolated leper. The possibility of transmission by bed-bugs may be ruled out, for Lutz states that no indigenous cases occurred in Vienna in the presence of numerous *Cimex lectularius* and cases of leprosy from the Balkans.

Petrocchi (J.). **Las especies argentinas del género** *Anopheles*. [The Argentine Species of *Anopheles*.]—*Physis*, vii, no. 24, p. 139. Buenos Aires, 12th December 1923.

The eight species of *Anopheles* known in Argentina are *A. annulipalpis*, *A. pictipennis* (*albitarsis*), *A. pseudopunctipennis*, *A. argyritarsis*, *A. tarsimaculatus*, *A. albimanus*, *A. maculipes* and *A. bachmanni*, by which name the author apparently intends to indicate a new species, though she does not describe it.

Bodine (J. H.). **A Note on the Toxicity of Acids for Mosquito Larvae.**—*Biol. Bull. Marine Biol. Lab.*, xlv, no. 3, pp. 149–152. Brooklyn, N.Y., September 1923.

The larvae of *Culex pipiens* were found to be extremely resistant to high concentrations of salicylic, oxalic, hydrochloric, butyric and acetic acids, the toxicity of the acids being in the order named. These substances apparently penetrate the insects by the mouth and not cutaneously. The larvae also withstand a higher concentration of mercury bichloride than the free-living Nematode (*Rabditis elegans*), *Daphnia* or tadpoles.

Barney (R. L.) & Anson (B. J.). **Abundance of the Mosquito-destroying Top-minnow, *Gambusia affinis*, especially in relation to Male Frequency.**—*Ecology*, ii, no. 1, pp. 53–69, 5 figs. Brooklyn, N.Y., January 1921.

A knowledge of the normal life conditions of *Gambusia affinis* is of importance in any practical effort to use it against mosquito larvae. Conclusions reached from the data given are that *Gambusia* frequency varies seasonally in the bayous, borrow-pits and wood pools of the vicinity of Mound, Louisiana. It increases rapidly from late April

to July or August, when a gradual decrease begins and continues through the autumn to bring it back to its normal winter level. The varying frequency depends on prolific spring and early summer production to bring it to its maximum point. The ecological factors, food, temperature of water, dissolved oxygen content and vegetation, as represented by different environments studied in this connection, may govern the abundance of *Gambusia* in those particular environments, but do not affect the general seasonal trend of the curves representing its frequency.

WEED (A. C.). **Another Factor in Mosquito Control.**—*Ecology*, v, no. 1, pp. 110–111. Brooklyn, N.Y., January 1924.

It has recently been observed that the growth of a thick mat of water hyacinth over the surface of a body of water is immediately followed by the destruction of mosquito larvae in that water. It frequently happens, however, that the growth of a similar mass of some other vegetation over the water is followed by a great increase in the mosquito population. The water covered with hyacinth was found to be full of small Entomostraca, probably *Ceriodaphnia*, and it seems probable that this creature is even more effective than *Gambusia*, or else, acting in conjunction with the latter, is able to keep down mosquitos.

MAYNAR (J.). **Contribución al estudio de la acción larvicida de las caráceas.** [Notes on the Larvicidal Action of Characeae.]—*Bol. R. Soc. Española Hist. Nat.*, xxiii, no. 9, pp. 389–392. Madrid, 30th November 1923.

The author has made a study of the pools in the region comprising a radius of about 20 miles around Saragossa, and in every case his findings have confirmed, sometimes in very striking fashion, those of Caballero regarding the larvicidal action of *Chara* spp. [*R. A. E.*, B, viii, 61 ; x, 136, 221 ; xi, 76]. In the laboratory, however, different results have been obtained. A single batch of *Culex* larvae, placed in filtered water in which *Chara* had been growing, died, probably from lack of food, but in the residue left after filtration they lived and developed into adults. Larvae of *Chironomus* developed normally in water containing 3 different species of *Chara*. As Caballero's experiments dealt with *Culex*, *Anopheles* and *Aëdes* (*Stegomyia*), the single case recorded above is not considered as disproving his theory.

BARBER (M. A.) & HAYNE (T. B.). **Some Notes on the Relation of Domestic Animals to** *Anopheles*.—*Pub. Health Repts.*, xxxix, no. 4, pp. 139–144. Washington, D.C., 25th January 1924.

These observations on the relation of domestic animals to *Anopheles* in the United States are published in view of the recent researches of Roubaud regarding the value of domestic animals as a protection to man against malaria. Many tests with traps in which men and pigs were used as baits have led to the conclusion that in the United States *Anopheles quadrimaculatus* and *A. crucians*, which are the common mosquitos, show no predilection for domestic animals over man, when such factors as size and amount of exposure are excluded. Conditions in general differ from those obtaining in France ; in the milder

southern States many domestic animals are free in pastures, night and day, throughout the year, and stables are often of very airy construction and rarely adjacent to human dwellings. There is little evidence that the Anophelines have become zoophilic in the sense described by Roubaud, or that they are likely to become so. One experiment indicated that engorgement with pig blood does not modify the subsequent avidity of *A. crucians* for human blood, nor materially affect the transmission by it of malaria parasites. Under the conditions of the tests, rabbits, which have been stated to be preferred hosts, appeared to offer no strong attraction for *Anopheles*.

Although very little light is thrown on the question as to whether increased opportunity for blood-sucking afforded by domestic animals leads to measurable increases in the production of *Anopheles* in any region, the indications are that the presence of suitable breeding water is the main determining factor in the production of mosquitos, and that increase in the numbers of domestic animals is not likely to make much difference in their abundance.

Barber (M. A.) & Hayne (T. B.). **Some Observations on the Dispersal of Adult** *Anopheles*.—*Pub. Health Repts.*, xxxix, no. 5, pp. 195–203. Washington, D.C., 1st February 1924.

The experiments described indicate that *Anopheles quadrimaculatus* does not remain long in a resting place, even in the case of females engorged with blood. At the most 40 per cent. were recovered in such places the day after being marked, and practically none six days later. The type of resting place does not appear to affect the time spent in such a place. If confined in these resting places, though ample food may be supplied, the mosquitos invariably die within a few days, whereas under natural conditions in the summer they may live at least 25 days. *A. quadrimaculatus* was found to disperse in effective numbers for about a mile from extensive breeding-places in rice fields, over relatively open country.

Dyé (L.). **Sur la recherche de gîtes d'***Anopheles* **dans les Côtes-du-Nord.**—*Bull. Soc. Zool. France*, xlvii, pp. 103–106. Paris, 1922–23.

This article consists of a list of all the districts in which larvae and pupae of either *Anopheles bifurcatus* or *A. maculipennis* were found, with the date on which they were noted.

Rudolfs (W.). **Note on the Mating of** *Anopheles maculipennis* **(Dipt. ; Culicidae).**—*Ent. News*, xxxv, no. 2, pp. 69–70. Philadelphia, Pa., February 1924.

The observations here described on the swarming and mating of *Anopheles maculipennis* were made in Holland during July.

Dye (W. H.). **Parasitic Mites on Mosquitoes.**—*Jl. R.A.M.C.*, xlii, no. 2, pp. 87–102, 13 figs. London, February 1924.

The following mosquitos were found in Northern Nyasaland, chiefly in houses : *Anopheles costalis, A. nili, A. mauritianus* (*paludis*), *A. funestus, A. pharoensis, Taeniorhynchus* (*Mansonia*) *africanus*,

Culex fatigans, *C. tipuliformis*, *C. bitaeniorhynchus*, *C. decens*, *Lutzia* (*C.*) *tigripes*, and *Aëdes argenteus* (*Stegomyia fasciata*). Of these *T. africanus* is the commonest species both indoors and out, and it feeds at all times of the day and night; *A. mauritianus* is abundant after sundown, while *A. costalis*, *C. fatigans*, *A. nili* and *A. funestus* were common, the remaining species being only occasionally met with.

Several of these mosquitos carried small parasitic mites, of apparently at least two species. During the latter part of the rainy season (March, April, May) these mites were found on *T. africanus*, *A. mauritianus*, *A. pharoensis* and *C. fatigans*, but during the cold weather (June, July, August) only on the first two species. In no case were male mosquitos found to be infested. In the adult stage these mites are apparently unable to survive even for a few minutes out of water. On becoming mature the larvae of the mites presumably detach themselves when the mosquito returns to water to oviposit, and there develop into the aquatic adult. It is thought that the larvae feed on the body fluids of their hosts, but it is difficult to say exactly how much they affect them.

The biting flies of the district were also examined for the presence of mites, but only *Stomoxys niger* was found infested, and with larvae of an entirely different species.

A translation of a small part of a paper dealing with mites found on mosquitos in Madagascar, by the French author, Dyé, is appended.

Langrishe (J. Du P.). **Mosquitoes in Bermuda.**—*Jl. R.A.M.C.*, xlii, no. 2, pp. 103–120, 9 figs. London, February 1924.

The topography of the Island is described. It is entirely composed of porous limestone, and rainwater, though abundant, never remains on the surface, so that there are no natural collections of fresh water or streams. The provision of receptacles for rainwater for domestic purposes is, however, compulsory, and unless suitably protected and treated, these afford excellent breeding-grounds for mosquitos.

Four species of mosquitos, all Culicines, have been recorded from Bermuda, the domestic breeders being *Culex fatigans* and *Aëdes argenteus* (*Stegomyia fasciata*), and the salt-marsh breeders, *A. sollicitans* and *A. taeniorhynchus*. Notes are given on the habits of these mosquitos and also a key for the determination of the larvae and adult females.

The existing regulations for the inspection of the water receptacles and destruction of mosquito larvae, and the required measures with regard to these potential breeding-places, are discussed.

Landis (E. M.). **A Tabular Account of the Structural Differences between the four Larval Instars of** *Culex pipiens*.—*Trans. Amer. Ent. Soc.*, xlix, no. 1, pp. 25–42, 4 pls. Philadelphia, Pa., March 1923. [Received 19th March 1924.]

In addition to variations due directly to growth, the four instars of *Culex pipiens* vary in certain characters in connection with degeneration and the disappearance of parts. A comparison of *C. pipiens* and *C. territans* (*restuans*) shows that an identification of the larvae can only be made safely when it is certain that these are of the fourth instar.

Mense (C.). **Handbuch der Tropenkrankheiten.** [Handbook of Tropical Diseases.]—3rd Edn., Vol. I, xviii+713 pp., 341 figs., 12 pls. Leipsic, J. A. Barth, 1924. Price 56.60 Gold Marks.

Contributions by A. Eysell on the Arthropod carriers and producers of disease and by V. Schilling on the study of blood in connection with tropical diseases, form the contents of this revised volume of this well-known work. Details of the anatomy of the more important blood-sucking insects are described and figured with full notes on the biology. The bibliographical lists will require expansion in a new edition as regards references subsequent to 1914.

Pavlovsky (E. N.) & Stein (A. K.). **Die *Gastrophilus*-Larve als Gastparasit in der Menschenhaut.** [An Oestrid Larva Parasitic in the Human Skin.]—*Parasitology*, xvi, no. 1, pp. 32–43, 5 figs. Cambridge, January 1924.

This is a more detailed illustrated account of a case already noticed [*R. A. E.*, B, x, 218] of *Oestrus* (*Gastrophilus*), probably *O.* (*G.*) *haemorrhoidalis*, infesting man. A general account is given of the occurrence of Oestrid larvae in man. In the case under discussion infestation occurred in the palm of the hand, and was probably acquired by passing the damp hand over an infected part of a horse's skin. The various forms of skin myiasis in general are discussed.

Ferris (G. F.). **The Mallophagan Family Menoponidae. Part I.**—*Parasitology*, xvi, no. 1, pp. 55–66, 5 figs. Cambridge, January 1924.

This is the first part of a paper, the purpose of which is the revision of the systematics of the lice of the family Menoponidae.

Woodland (W. N. F.). **On the Life-cycle of *Hymenolepis fraterna* (*H. nana* var. *fraterna* Stiles) of the White Mouse.**—*Parasitology*, xvi, no. 1, pp. 69–83. Cambridge, January 1924.

The present observations confirm those of previous authors, the ingestion of eggs of *Hymenolepis* being sufficient to infect mice with this tape-worm without the intervention of any intermediate host. This does not exclude the possibility of these eggs occasionally developing into a cysticercoid inside the body cavity of a flea, and undergoing the rest of its development when the flea is eaten by a mouse.

Puri (I. M.). **Studies on the Anatomy of *Cimex lectularius*. I.**—*Parasitology*, xvi, no. 1, pp. 84–97, 1 pl., 12 figs. Cambridge, January 1924.

This paper is exclusively concerned with the anatomical details of the mouth-parts, salivary pump, salivary glands and nephrocytes of *Cimex lectularius*, these parts being generally omitted or incorrectly or insufficiently described in the literature.

Hadwen (S.) & Fulton (J. S.). **On the Migration of *Hypoderma lineatum* from the Skin to the Gullet.**—*Parasitology*, xvi, no. 1, pp. 98–106, 1 pl. Cambridge, January 1924.

These observations, which were made in Saskatchewan, show that the migration of the larvae of *Hypoderma lineatum* from the skin to

the oesophagus is much more rapid than has been supposed, and that they are barely twice the size of a newly hatched larva when they reach the chest cavity. An undoubted first stage larva has been found in the oesophagus as well as several very small larvae, which are possibly first stage forms that have undergone an extension of integument during their growth, consequently causing a wider separation in the rows of spines.

Wherever the eggs are laid, the underlying tissues show the tracks followed by the larvae; further observations are, however, necessary a little earlier in the season to establish the whole course of the migration. It is evident that the larvae follow the path of least resistance through the connective tissues, and as there are only certain routes that would lead them to their destination, they should be comparatively easily found. The yellow oedematous tissue that surrounds the larvae is of great assistance in tracing them. Though it has previously been stated that no appreciable lesions occur on the leg below the knee and hocks, this is now found to be correct only as regards external appearances, as in all *post mortem* examinations made in the spring, except in young animals, subcutaneous lesions were found to be particularly severe above the heels and in the triangular space above the sesamoid bones. These lesions probably are not apparent externally owing to the thickness and tightness of the skin on the legs at this point. The lameness noticed in cattle during the warble season may be attributed to this cause. These observations require further confirmation. The pathological reaction to, and immunity from, warble grubs are discussed. Although in older animals (over 2 years old) skin and subdermal lesions were found that were well marked and characteristic of warble infestation, no larvae were discovered either outside the oesophagus or under the mucous coat. The immunity developing in older cattle is apparently effective in the prevention of warbles, and attempts are to be made to assist the process of immunity by injecting young animals.

As the larvae bore through the skin in regions that come in contact with the soil, diseases such as blackleg and anthrax might be inoculated by them in their passage through the skin. This possibility has not yet been investigated, but in the present studies it has been shown that the larvae reach the thoracic cavity in a sterile condition. They are obviously not infected when they reach such places as the pericardium, otherwise there would be more deaths during the warble season.

In Saskatoon adults of *H. lineatum* were first noticed on the 30th May, and the eggs had hatched by the 10th June; *H. bovis* had not appeared in June or early July.

Dschunkovsky (E.) & Urodschevich (V.). **Theileriasis in Goats, Sheep and Cattle, with a Description of *Theileria hirci* n. sp. from Serbia.**—*Parasitology*, xvi, no. 1, pp. 107–110, 2 figs. Cambridge, January 1924.

The piroplasms that have been recorded from sheep and cattle are briefly reviewed.

Piroplasmosis in goats has not previously been recorded from Europe. The outbreak here discussed occurred in Serbia, causing 46 per cent. mortality among 39 animals attacked. The causative agent is described as *Theileria hirci*, sp. n., and it is compared with *Gonderia hirci* from Asia. It is highly probable that the tick,

Rhipicephalus bursa, acts as vector of this disease, in spite of a negative experiment described. During 1921 *R. bursa* was taken from healthy and characteristically affected goats, and was the only tick found on these animals.

Attention is drawn to the fact that piroplasmosis of sheep occurs all over Macedonia, where it is of great economic importance, though there appears to be no previous mention of it in literature.

HINDLE (E.). **Myiasis in *Bufo regularis* caused by a Tabanid Larva.**—*Parasitology*, xvi, no. 1, pp. 111–112, 1 pl. Cambridge, January 1924.

The occurrence of a Tabanid larva inside a toad (*Bufo regularis*) is described. The larva was almost full-grown, and was contained in an elongated sac-like diverticulum of the right lung. Its presence is considered to be accidental, the young larva having probably been swallowed by the toad, but shows the adaptability of some species of Dipterous larvae [*cf. R.A.E.*, B, xi, 148].

KEILIN (D.). **On the Life History of *Neottiophilum praeustum* (Meigen 1826) (Diptera-Acalypterae) parasitic on Birds, with some general Considerations on the Problem of Myiasis in Plants, Animals and Man.**—*Parasitology*, xvi, no. 1, pp. 113–126, 1 pl., 3 figs. Cambridge, January 1924.

The following is the author's summary :—

Neottiophilum praeustum, Meig., is an Acalyptrate fly, the larva of which inhabits the nests of various birds. The structure of the early stages of this fly, namely egg, larva and pupa, is here described for the first time. Hendel's view that *Neottiophilum* should be separated into a new family is confirmed. The larvae of *Neottiphilum* live as intermittent blood-sucking parasites upon the birds. Their feeding habits are similar to those of *Phormia* and *Passeromyia*.

The structure of the pharynx in Cyclorhaphous Dipterous larvae gives important indications as to the mode of feeding. Those larvae that are provided with longitudinal ridges are saprophagous, *i.e.*, living upon decomposed vegetable or animal substances, while those that are devoid of ridges are biontophagous, *i.e.*, feeding upon living substances (parasites in plants and in animals, predacious, or living in the uterus of the mother). This generalisation, when applied to the study of forms of myiasis in plants, animals and man, enables them to be separated into two categories : primary or parasitic myiasis, and secondary or pseudoparasitic myiasis, either accidental (intestinal) or following upon bacterial infection.

SPENCER (R. R.) & PARKER (R. R.). **Rocky Mountain Spotted Fever : Viability of the Virus in Animal Tissues.**—*Pub. Health Repts.*, xxix, no. 2, pp. 55–57. Washington, D.C., 11th January 1924.

In continuance of previous investigations [*R.A.E.*, B, xi, 89, 183, etc.] tests have been made regarding the survival of the virus of Rocky Mountain spotted fever in mammalian tissues. The results lead to the following conclusions :—The virus of Rocky Mountain spotted fever survives in glycerine for more than 10 months when kept at 14° F. The testicle is a more favourable tissue for the preservation

of the virus in glycerine than the spleen or liver. Tissue virus dried in vacuo survived 2 months when kept at 14° F. No loss of virulence of the virus kept in glycerine was noted, since the 8th passage of the virus still showed full virulence for guinea-pigs, producing typical lesions.

WALSH (D.). **Insect Bites and Stings.**— *Jl. Trop. Med. & Hygiene*, xxvii, no. 3, pp. 25–26. London, 1st February 1924.

The object of this article is to draw attention to a few salient points regarding the consequences arising from insect bites and stings and simple methods of dealing with them. In Britain cases are rarely of sufficient importance to require medical attention; in tropical countries the subject is complicated by the greater number of biting insects and the variety of poisons, bacterial and chemical, that may be thus inoculated. The treatment that has given the best results is an ointment of dimol, which is a powerful bactericide and is non-toxic and non-irritant to the tissues, and which should be vigorously rubbed into the puncture.

SHORTT (H. E.). **The Occurrence of Malaria in a Hill Station.**— *Ind. Jl. Med. Res.*, xi, no. 3, pp. 771–789, 1 map, 5 charts, 4 figs. Calcutta, January 1924.

Shillong, though at a height of 5,000 ft., possesses all the factors essential for the occurrence of malaria.

During 1922 the following Anophelines were taken in the town or its immediate vicinity: *Anopheles maculatus, A. fuliginosus, A. gigas, A. minimus, A. subpictus* (*rossi*), *A. vagus, A. lindesayi, A. hyrcanus* (*sinensis*) and *A. aitkeni*. Notes are given on the habits of these species, only the first three being found in large numbers, and only the first two being considered of importance as carriers of malaria.

A. fuliginosus is very seldom found in houses where cattle-sheds are available, and is not likely to become a common carrier, so that *A. maculatus*, which was numerous both in dwellings and in cattle-sheds, must be considered the chief species concerned.

With regard to breeding places, though certain species show a predilection for certain types of breeding grounds, they prove to be very adaptable when these are not available, as is often the case in hilly areas where drainage of surface water is rapid. The natural streams and isolated pools along the river course form ample breeding grounds for *A. maculatus*.

The occurrence of malaria in Shillong up to 1922 is reviewed, showing a malarial season for normal years from about the middle of May to the middle of October. There was an undoubted increase of the disease during 1922, which could not be attributed to any definite reason. The prevention of another epidemic can only be hoped for by the removal of one of the essential links in the chain of infection. It is suggested that the control of the Anopheline breeding grounds would probably be most easily solved by a canalisation of streams, so as to prevent the formation of isolated pools, and the proper supervision of their tributaries.

In the course of dissections made, a certain number of *A. maculatus* were found to be infected with a very large species of *Nosema*.

Russell (A. J. H.), Adisesha Ayyar & Ubhaya (—). **Epidemiological Observations on an Epidemic of Relapsing Fever in Madras Presidency.**— *Ind. Jl. Med. Res.*, xi, no. 3, pp. 791–806, 2 graphs, 1 map. Calcutta, January 1924.

The conclusion that relapsing fever is a new disease in Madras is confirmed, and there is no reason to believe that it had existed there before 1921 and escaped notice. The reasons for incriminating lice as the carriers are given, and though climatic conditions during May and June are least favourable to *Pediculus*, it is doubtful if in southern India it is ever hot or dry enough to interfere with its life-cycle.

Although the possible occurrence of typhus was carefully looked for, no single suspicious case was met with.

Sinton (J. A.). **Notes on some Indian Species of the Genus** *Phlebotomus*. **Part III. Provisional Diagnostic Table of the Males of the Species and Varieties recorded from India and Ceylon. Part IV.** *Phlebotomus himalayensis* **Annandale 1910.**— *Ind. Jl. Med. Res.*, xi, no. 3, pp. 807–824, 2 pls. Calcutta, January 1924.

In view of the importance of *Phlebotomus papatasii* and probably other species of this genus in the transmission of diseases, as well as the existence of new species and varieties since the publication of Brunetti's table (1912), a revised and up to date table is here given.

Both sexes of *Phlebotomus himalayensis*, Annan., are described in detail.

Barraud (P. J.). **A Revision of the Culicine Mosquitoes of India. Part viii. Further Description of Indian Species of** *Finlaya* **Theo.**— *Ind. Jl. Med. Res.*, xi, no. 3, pp. 845–866, 10 pls. Calcutta, January 1924.

In continuation of the previous paper [*R.A.E.*, B, xii, 8] the adults of the remaining 18 species of *Aëdes* (*Finlaya*) at present known from the Indian region are dealt with here, including *A.* (*F.*) *greeni*, Theo. var. *ranarana*, n., from the Central Provinces and Nilgiri Hills; and *A.* (*F.*) *dissimilis*, Leic. var. *karwari*, n., from Assam, Eastern Bengal, Northern Bengal and Darjiling Hills. Larvae of the latter were found in September and October in tree-holes.

A key to the adults of the Indian species of *Finlaya* is given.

Patton (W. S.). **1. Note on the Occurrence of** *Hypoderma lineatum* **Villiers in the Punjab. 2. Note on the Second Stage Larva of** *Hypoderma crossi* **Patton. 3.** *Gasterophilus crossi* **sp. nov., Parasitic in its Larval Stage in the Stomach of the Horse in the Punjab.**— *Ind. Jl. Med. Res.*, xi, no. 3, pp. 961–963. Calcutta, January 1924.

Hypoderma lineatum, Vill., is a common parasite in its larval stages in the skins of cattle in the Punjab and may occasionally be found in goats; the more common species in these animals is, however, *H. crossi*, Patton, which may also occasionally be found in cattle. A description is given of the second stage larva of this species. *Oestrus* (*Gasterophilus*) *crossi*, sp. n., is described from the Punjab; two females were bred from larvae taken from the excreta of horses.

Shortt (H. E.) & Swaminath (O. S.). **Note on the Infection of a Mouse by means of Bed-bugs, *Cimex hemiptera* Fabr., fed on the Peripheral Blood of a Case of Kala-azar.**— *Ind. Jl. Med. Res.*, xi, no. 3, pp. 965–966. Calcutta, January 1924.

From these experiments it is concluded that *Cimex hemiptera*, F., fed on a kala-azar case may contain, after the lapse of nine days, forms of *Leishmania* (*Herpetomonas*) *donovani*, which are capable of infecting white mice when inoculated intra-peritoneally. The authors have found that flagellation of the forms ingested by the bugs takes place within three to six days.

Barraud (P. J.). **A New Mosquito from Kashmir.**— *Ind. Jl. Med. Res.*, xi, no. 3, pp. 967–968, 1 fig. Calcutta, January 1924.

Both sexes of *Aëdes* (*Finlaya*) *sintoni*, sp. n., are described from Kashmir, where they were reared from larvae.

von Schroetter (H.). **Zur Kenntnis der Leishmaniosis cutanea, der sogenannten Orientbeule.** [A Contribution to the Knowledge of cutaneous Leishmaniasis, the so-called Oriental Boil.]— *Arch. Schiffs- u. Trop.-Hyg.*, xxvii, no. 7, pp. 234–246, 5 plates. Leipsic, 1923.

In 1917 the author ascertained that transmission of cutaneous leishmaniasis in the Valley of the Jordan was probably effected by a new species of *Phlebotomus*, to which he gives the name *Phlebotomus* el Ghôr.

Larrousse (F.). **Au sujet d'un prétendu phlébotome hôte vecteur possible du bouton d'Orient.**— *Ann. Parasit. hum. & comp.*, ii, no. 1, p. 102. Paris, January 1924.

It is pointed out that the insect described by von Schroetter as *Phlebotomus* el Ghôr in the preceding paper is evidently not a member of this genus at all, but a Psychodid, probably *Psychoda* sp. which, not being a blood-sucker, cannot be a transmitter of Oriental sore.

Larrousse (F.). **Triatomes d'Asie ; description d'une nouvelle espèce, *Triatoma bouvieri* n. sp.**— *Ann. Parasit. hum. & comp.*, ii, no. 1, pp. 62–70, 4 figs. Paris, January 1924.

The following Asiatic species of *Triatoma* are dealt with :—*T. rubrofasciata*, DeG., occurring in Asia, Africa and South America, which is a domestic species, found particularly in houses and pigeon-lofts near the coast ; *T. rubrovaria*, Blanch., from Brazil, Uruguay and Java, found biting man in neglected houses, and the bearer of flagellates that should be further studied ; *T. migrans*, Breddin, from Java ; and *T. bouvieri*, sp. n., described from Annam. The opinions of various authors regarding the possible transmission by these Reduviids of leishmaniasis and Chagas' disease [caused by *Trypanosoma cruzi*] are quoted.

LEON (N.). **Sur l'appareil buccal de la punaise des lits** (*Cimex lectularius*).— *Ann. Parasit. hum. & comp.*, ii, no. 1, pp. 71–73, 2 figs. Paris, January 1924.

In view of the difference of opinions expressed regarding the construction of the mouth-parts of *Cimex lectularius*, L., the author gives a description and figure of these organs, showing that the central piercing portion, formed of the lower setae, is traversed, throughout its length, by two canals, the upper and larger one conducting exclusively blood to the pharynx, while the lower and much narrower one emits saliva into the wound.

DE BUEN (S.). **Distribution géographique de quelques maladies parasitaires en Espagne.**— *Ann. Parasit. hum. & comp.*, ii, no. 1, pp. 90–98, 3 figs. Paris, January 1924.

The distribution of various parasitic diseases in Spain is discussed, those dealt with including recurrent fever, infective jaundice, malaria, and leishmaniasis.

DUNN (L. H.). **Life History of the Tropical Bed-bug,** *Cimex rotundatus*, **in Panama.**— *Amer. Jl. Trop. Med.*, iv, no. 1, pp. 77–83. Baltimore, Md., January 1924.

These life-history observations on *Cimex hemiptera* (*rotundatus*) were made during 1921 in the Panama Canal Zone. Details are given of the duration of the various stages, as well as of the feeding habits of the adults.

GLASER (R. W.). **The Relation of Microörganisms to the Development and Longevity of Flies.**— *Amer. Jl. Trop. Med.*, iv, no. 1, pp. 85–107, 3 figs. Baltimore, Md., January 1924.

In the experiments here described the flies used were *Drosophila melanogaster*, *Musca domestica*, *Stomoxys calcitrans* and *Lyperosia irritans*, the results being summarised by the author as follows :—

The growing or larval stages of flies are dependent upon certain accessory growth factors, which must be ingested with the food. These accessory growth factors are obtained by the larvae from bacteria or yeasts, as well as from higher plant and animal tissues.

When rearing flies on media sterilised at high temperatures, the necessary growth factors for the larvae are destroyed, but can be replaced by contaminating the media with living bacteria or yeasts, by adding large quantities of dead bacteria or yeasts killed at low heat, or by adding fresh sterile animal tissue extracts or fresh, sterile plant juices. Non-pathogenic bacteria, when ingested by adult flies, shorten their life span and reduce the number of ovipositions.

Microörganisms and their activities are not absolutely essential to the normal growth, development and longevity of the flies investigated.

Microörganisms are present in wild flies, especially in the larvae, because owing to their habits the ingestion of bacteria, yeasts, fungi, etc., cannot be avoided. Microörganisms may be one of the principal sources for the accessory growth factors of some larval flies found breeding in certain types of media in a state of nature, but this assumption must not be regarded as a proved fact.

Faust (E. C.). **The Possible Incidence of River Fever (Tsutsugamushi Disease) in the Central Yangtze Valley.**—*China Med. Jl.*, xxxvii, no. 12, pp. 979–987, 16 figs. Shanghai, December 1923.

Two cases of this disease are described, and the importance of watching for its occurrence in China, as well as of determining the distribution of Trombidiid mites, is pointed out.

A disease greatly resembling river fever is recorded from the jungles of Central Burma, where it is said to be due to the bite of a tick not yet identified.

Ewing (H. E.). U.S. Bur. Ent. **Our only common North American Chigger, its Distribution and Nomenclature.**—*Jl. Agric. Res.*, xxvi, no. 9, pp. 401–403. Washington, D.C., 1st December 1923.

From a recent study of the North American chigger mites, *Trombicula tlalzahuatl*, Murray, appears to be the most common species attacking man and domestic animals. The adult is probably *T. cinnabaris*, Ewing [*R.A.E.*, B, ix, 79], the only adult form known to be distributed over the same region. *T. tlalzahuatl* occurs from Long Island to Central Mexico and from the Rocky Mountains to the Atlantic Coast, being found on land actually flooded at times by tidal waters as well as up in the Appalachian Mountains. In the more humid southern parts of its range it is found almost anywhere where there is rough growth of woods or shrubbery, whereas in the northern limits it occurs in isolated localities where the local conditions are favourable for its maintenance.

A list is given of the localities and hosts from which *T. tlalzahuatl* has been determined by the author.

Leptus (*Trombicula* ?) *similis* recorded in a paper by Hirst [*R.A.E.*, B, x, 129] from poultry in the United States, is identical with *T. tlalzahuatl*, and it is probable that *Leptus irritans*, Riley, is the same species.

Jack (R. W.). **Tsetse Fly. Inspection of Shangani Experimental Area.**—*Rhodesia Agric. Jl.*, xx, no. 6. pp. 653–662. Salisbury, December 1923.

Following upon the four years' experiment in game elimination in Southern Rhodesia previously described [*R.A.E.*, B, xi, 140] the author paid a brief visit of inspection during August 1923, when the situation with regard to the occurrence of tsetse-fly [*Glossina morsitans*, Westw.] was again studied.

The opinion is expressed that there has been a marked diminution and, apparently, considerable retrogression of the fly, especially in the areas in which the shooting of game has been most effectively carried out.

Walton (C. L.). **Preliminary Report on the Agricultural Zoology of North Wales.**—*Univ. Coll. N. Wales, Dept. Agric.*, 28 pp. Bangor. [February 1924.]

In these notes on the chief pests of live stock, the Arthropods recorded include: on horses, *Ixodes ricinus*; *Oestrus* (*Gastrophilus*) *intestinalis* (*equi*); and *Hypoderma lineatum* (warble fly): on cattle, *I. ricinus*, which is of importance as the transmitter of *Babesia*

divergens, causing redwater, which is still prevalent in Carnarvon; *Haematopinus eurysternus* (ox louse), troublesome chiefly in early spring; *Hypoderma lineatum* and *H. bovis* (warble flies), which are commonly found, especially the former, and are extracted in some numbers in the spring by jackdaws, which visit the cattle for the purpose; mosquitos, including *Theobaldia annulata* and *Anopheles maculipennis*, of which further study is being made [*R.A.E.*, B, xii, 30]; the Tabanids, *Haematopota pluvialis* and *H. crassicornis*, troublesome to man and animals, the larvae of which are believed to occur in the humus of cultivated fields, though the life-history is not well known, *Tabanus sudeticus* and, to a less extent, *T. cordiger*; and *Hippobosca equina* (forest fly): on sheep, *Ixodes ricinus*, which is said to cause the death of lambs in one district; *Trichodectes ovis* (sheep louse), found chiefly among the mountain flocks; *Melophagus ovinus*, the intermediate host of the blood parasite *Trypanosoma melophagium*; *Lucilia sericata* (sheep-maggot fly), troublesome from May to October whenever weather conditions are favourable, especially in sheltered places among fern or near woods, and *Cephenomyia* (*Oestrus*) *ovis* (sheep nostril fly), occurring in small numbers: on pigs, *Haematopinus suis* (pig louse): and on poultry *Dermanyssus avium* (*gallinae*) (red hen mite), abundant in old, dark, damp poultry houses; and various species of lice.

GRANATO (L.). **A piolheira dos animaes.** [Infestation of Animals by Lice.]—*Rev. Soc. Rur. Brasileira*, v, no. 43, pp. 16–19. S. Paulo, January 1924.

This is a brief review of the lice affecting different classes of animals and of the remedies usually employed against them.

HOWARD (L. O.). **Report [1922–23] of the Entomologist.**—*U.S. Dept. Agric.*, 37 pp. Washington, D.C., 1923. [Received 3rd March 1924.]

Work in connection with screw-worm flies [*Cochliomyia macellaria*] and blowflies has been continued [*R.A.E.*, B, xi, 92]. The conical screen trap advocated by the U.S. Bureau of Entomology is being generally used in the south-western areas most heavily infested with screw-worms. Where the bodies of small wild animals can readily be obtained for baits these are more economical than commercial dried baits, especially if they are kept moist and maggot breeding is prevented by surrounding the bait in the pan with water containing borax or nicotine sulphate. Commercial dried egg is satisfactory if each pan is baited with 6 oz. dried egg to which have been added 5 grammes of sodium carbonate and 1½ U.S. quarts of water. As a larvicide for destroying screw-worms and other maggots in wounds on livestock, benzol (100 per cent.) is very promising. Various repellents for keeping flies from infesting wounds have been tested. Among the most promising are a mixture of 1 part furfural, 3 parts commercial pine-tar oil, and one of 1 part safrol and 3 parts medium pine-tar. Several light pine-tar oils have shown marked repellent effect, and the whole series will be tested in combination with other repellents.

Evidence indicates that the ox warble [*Hypoderma*] might be eradicated by concerted action adequately financed. Over 98 per cent. of the grubs can be killed by a general application to the backs of cattle of powdered derris root, and over 96 per cent. by a wash consisting of

1 lb. derris and 4 oz. soap to 1 U.S. gal. water. An ointment consisting of 1 part derris and 5 parts vaseline gave almost 100 per cent. mortality when the material was pressed into each hole, as also did injections of 100 per cent. benzol with an oil can.

Both biting and sucking lice can be almost entirely destroyed by dusting hellebore over the affected animals.

Mohler (J. R.). **Report [1922–23] of the Chief of the Bureau of Animal Industry.**— *U.S. Dept. Agric.*, 56 pp. Washington, D.C., 1923. [Received 3rd March 1924.]

In the treatment of animals for external parasites several substances were tested for the prevention of ox warbles [*Hypoderma*], including processed crude petroleum or fuel oil, and pine tar emulsions placed in wading tanks, which did not prevent infestation. A 2 per cent. solution of coal-tar creosote, however, prevented infestation in the case of 12 animals, while out of 12 left untreated 8 became infested. In animals showing full-sized openings of the skin before warbles had begun to emerge in January exposure for 25 minutes to sulphur dioxide in a gas chamber killed about 90 per cent. of the warbles and apparently had no bad effect on the animals. The same treatment was tried on chronic cases of horse mange but without success; for cattle lice, 20 minutes' exposure to the gas destroys all lice but not the eggs, which will hatch even after 30 minutes' exposure. Oestrid larvae in the heads of sheep can apparently be destroyed by the application of equal parts of chloretone (trichlorbutyl alcohol) and ether, or liquid petroleum and chloroform applied as a spray with an ordinary atomiser, but further work is necessary to determine whether the treatment is practicable and effective.

Hall (M. C.). **Parasites and Parasitic Disease of Sheep.**— *U.S. Dept. Agric.*, Farmers' Bull. 1330, 53 pp., 34 figs. Washington, D.C., April 1923.

This is a revision of a bulletin previously noticed [*R. A. E.*, B, ix, 110].

Gallagher (B. A.). **Diseases of Poultry.**— *U.S. Dept. Agric.*, Farmers' Bull. 1337, 40 pp., 15 figs. Washington, D.C., July 1923. [Received 3rd March 1924.]

The various parasites of poultry are dealt with, including lice, mites, ticks and fleas, the information regarding their treatment being largely quoted from papers previously noticed.

Davidson (W. M.). **Results of Experiments with Miscellaneous Substances against the Chicken Mite.**— *U.S. Dept. Agric.*, Dept. Bull. 1228, 10 pp. Washington, D.C., 23rd January 1924.

Various remedies have been tried against the chicken mite, *Dermanyssus gallinae*, De G., and many are here described, including fumigation, dusting, spraying, painting, etc. From the results recorded, the recommendation is made to use heavy oils from coal tar and wood tar, or such oils diluted with a lighter oil, such as kerosene, so that not less than 20 per cent. of the mixture is heavy oil; this will successfully control the mites, provided the fowl houses are thoroughly sprayed and

sufficient material used. A heavy mineral-oil emulsion with at least 20 per cent. oil in the actual spray will be efficient under similar conditions.

Jones (T. H.) & Bradley (W. G.). **Further Observations on Tabanidae (Horseflies) in Louisiana.**—*Jl. Econ. Ent.*, xvii, no. 1, pp. 45–50. Geneva, N.Y., February 1924.

As a result of observations made during 1923 only *Tabanus nefarius*, Hine, is added to the list of Tabanids occurring in Louisiana [*R. A. E.*, B, xi, 144]. The larvae of nine species that had not previously been taken in this stage have been collected in the field. A table is given showing the seasonal occurrence of the adult Tabanids in the vicinity of Baton Rouge as indicated by collections made during 1922 and 1923. *Tabanus costalis*, Wied., *T. fuscicostatus*, Hine, *T. lineola*, F., *Chrysops obsoleta*, Wied., and *C. vittata*, Wied., were the most annoying and harmful pests of stock. The adults of these species are prevalent from the beginning of May to the beginning of September. Though adults of other species appeared in greater numbers at certain times of the year, their attack extended over a more or less limited period. This was particularly true of *T. pumilus*, Macq., which, however, caused more injury than any other species in the same period of time.

Magarinos Torres (C. de). **Habronémose pulmonaire** (*Habronema muscae* **Carter**) **expérimentalement reproduite chez le Cobaye.**—*C. R. Soc. Biol.*, xc, no. 3, pp. 242–243. Paris, 1924.

The experiment here described proves that the larvae of *Habronema muscae*, Carter, if deposited in wounds of a guinea-pig, are able to reach the lungs, for the tissue of which they appear to have a marked preference. The frequent simultaneous appearance of summer sores and peribronchial nodules in equines may possibly be explained by this migration of larvae that have been deposited in the sores.

Séguy (E.). **Sur le** *Cephalopsis titillator* **Clark.**—*Bull. Mus. Natnl. Hist. nat.*, no. 5, pp. 387–390, 3 figs. Paris, 1923.

The larva of *Cephalopsis titillator*, Clark, found throughout Northern Africa, is a parasite of camels and horses. The various larval stages and the adult are fully described.

Séguy (E.). **Note sur les larves des** *Muscina stabulans* **et** *assimilis* **(Diptères).**—*Bull. Mus. Natnl. Hist. nat.*, no. 6, pp. 443–445, 6 figs. Paris, 1923.

The larvae of *Muscina stabulans* and *M. assimilis* may cause fatal myiasis in young birds, especially the latter. The occasional and secondary parasitism of these flies may be compared with that of *Passeromyia heterochaeta*, a very general parasite of birds. The morphology of the larvae, and also of the adults, of these two genera is so similar that possibly *P. heterochaeta* has only recently become adapted to parasitism, and under favourable conditions *M. stabulans* and *M. assimilis* may become habitual instead of occasional parasites.

RODHAIN (J.). **Larve de diptère parasite cuticole de l'Eléphant d'Afrique.** —*Bull. Soc. Path. exot.*, xvii, no. 1, pp. 86–92, 1 fig. Paris, 1924.

Ruttenia loxodontis, gen. et sp. n., provisionally placed near *Neocuterebra*, is described from larvae infesting elephants in the Belgian Congo. The larvae were located in the skin of the flank, shoulder, thigh and rump, but never in the feet. They do not appear to cause any marked reaction. The points of difference between these larvae and those of *Neocuterebra squamosa*, Grünb. [*R. A. E.*, B, vii, 117] are indicated.

NIESCHULZ (O.). *Haemaphysalis bispinosa* **Neum., nieuw voor de fauna van Nederl.-Indië.** [*H. bispinosa*, a new Record for the Dutch East Indies.]—*Tijdschr. voor Diergeneesk.*, li, no. 5, pp. 195–196. The Hague, 1924.

A collection of about 300 ticks from native cattle in Sumatra included many specimens of *Boophilus annulatus australis*, Full., some of *Rhipicephalus sanguineus*, Latr., and also a male and female of *Haemaphysalis bispinosa*, Neum.

FAYET (—). **A propos de la gale démodécique du chien.**—*Rev. vét.*, lxxvi, no. 3, pp. 152–156. Toulouse, March 1924.

In view of the prevalence of mange caused by *Demodex* in dogs in Paris and certain other large towns, attention is drawn to the importance of a careful early diagnosis of the cases and to the lack of knowledge concerning the disease both among the general public and in veterinary practice.

ACOSTA (D.). **Algunos parasitos de los animales domesticos.** [Some Parasites of Domestic Animals.]—*Agricultor Mexicano*, xxxix, nos. 11, 12, pp. 333–335, 349–353; xl, nos. 1, 2, 3, pp. 9–13, 57–59, 76–79. C. Juarez, Chih. (Mexico), November 1923–March 1924.

This brief account of various insects, mites and ticks infesting domestic animals is intended for the guidance of Mexican agriculturists.

MYERS (J. G.) & ATKINSON (E.). **The Relation of Birds to Agriculture in New Zealand. vii. The Herons & Ducks.**—*N. Z. Jl. Agric.*, xxviii, no. 1, pp. 35–42. Wellington, N.Z., 21st January 1924.

It has been suggested that one or more species of the smaller egrets, which in parts of Africa perch on the bodies of cattle and feed on the ticks infesting them, should be introduced into New Zealand against the cattle-tick, *Haemaphysalis bispinosa*. The authors point out, however, that if birds or mammals are to be introduced into a fresh country they should first receive the same exact scientific study that is given to insect parasites before being liberated, as their behaviour in new surroundings can never be predicted. The introduction of egrets is in any case considered unnecessary, owing to the presence of starlings which, although they may do some damage in fruitgrowing districts, are very valuable as destroyers of cattle-ticks.

Ducks, even the domestic kinds, eagerly devour mosquitos in the larval stage. Ten domestic ducks introduced into a heavily infested fishpond 1,400 sq. ft. in area cleared it of all pupae in 24 hours and of all but the very smallest larvae in 48 hours.

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Trypanosomiases: Surra.—*Proc. Second Meeting Vet. Officers in India, Calcutta, 26th February to 2nd March 1923,* pp. 71–77. Calcutta, 1924.

A discussion is reported on the adequacy of the existing legislation for the control of surra, the present position in regard to research and the efficacy of methods of treatment, and information with regard to the forms of trypanosomiasis, other than surra [caused by *Trypanosoma evansi*], found in India.

A committee was subsequently appointed, and the following resolution was drafted and unanimously passed by the meeting: (1) Investigations into the nature and mode of transmission of the animal trypanosomiases in India should be prosecuted forthwith. Likewise, the whole problem of the important protozoan diseases of the domesticated animals of the country should be approached concurrently. For this purpose it will be necessary to strengthen the technical resources at present available in the country for research into different aspects of the above projects, comprising the entomological, protozoological, and pathological aspects, by centralisation of the facilities available in each of these pursuits, and the delegation, on request, of workers to assist those engaged directly in the elucidation of the disease problems. An experienced protozoologist should be appointed to the staff of the Imperial Bacteriological Laboratory for research into these problems. Entomological assistance should be derived from the staff of the Imperial Entomologist. These workers would find unlimited scope for their activities, in addition, in the investigation of the economically highly important diseases of live-stock caused by protozoan parasites, other than those of surra. (2) Efforts to obtain a cheap, effective and easily applied remedy for the cure of surra, in particular, and other protozoan diseases should be prosecuted on a large scale in the laboratory and in the field, and the co-ordinated services of the whole veterinary profession in India are required for this purpose. (3) In view of our present inadequate knowledge of the trypanosomiases of animals in India, and the likelihood that the pathogenic trypanosomes frequently find a reservoir in relatively resistant host species, the present legislative measures dealing with surra should be reconsidered in the light of better information that may be procured on further research directed with the object of elucidating these peculiar conditions.

Parasitology (Helminthology and Entomology).—*Proc. Second Meeting Vet. Officers in India, Calcutta, 26th February to 2nd March 1923,* pp. 88–91. Calcutta, 1924.

The subject under discussion was the necessity for instituting a survey of the incidence of the grosser parasites of live-stock in India and for the formation of central departments to control work in this connection.

The committee appointed to deal with the subject of trypanosomiasis [see preceding paper] drew up the following resolution embodying the views of the meeting, which was passed unanimously: On account of the great importance of insects in the transmission of animal diseases, as causes of direct injury to live-stock in India, and the high degree of specialisation necessary for a proper appreciation of the various aspects of entomology, the staff of the Imperial Entomologist should be strengthened to the degree requisite for rendering assistance to investigators into the insect problems connected with animal diseases.

Similarly, facilities should be rendered for the establishment of a staff attached either to the Imperial Entomologist or to the Zoological Survey of India for the study of ticks and mites concerned with animal diseases.

FULLER (C.). **Tsetse in the Transvaal and Surrounding Territories : an Historical Review.**— *Union S. Africa Dept. Agric.*, Ent. Mem. no. 1, 68 pp., 7 pls., 9 maps. Pretoria, 1923. [Received 11th March 1924.]

This review of the occurrence of tsetse-fly (*Glossina*) in the Transvaal begins with the year 1836, when the first record was made, and surveys the various periods up to recent times. With regard to the gradual disappearance of tsetse from the Transvaal and surrounding territories, the following observations are noted : The disappearance of the insect accompanied the extinction or driving away of certain large wild animals, but it also occurred even in the presence of many possible sources of food supply as presented by a variety of wild animals, including antelopes, wildebeeste, zebra, and, in settled areas, by domestic animals ; it took place throughout many areas in the absence of any general settlement by Europeans ; and it did not coincide with any abnormal climatic condition. In the north-west Transvaal the fly seems to have been very dependent upon peculiar and circumscribed plant-assemblies for a favourable habitat, and to have found an appropriate food-supply in the blood of certain wild animals regularly frequenting its haunts. As the flora and fauna of any area are always closely associated, it is probable that some inter-relationship existed between the tsetse and its animal hosts, the permanency of its occurrence depending upon this combination of flora and fauna. The disappearance of tsetse from the eastern low country of the Transvaal and the adjoining Portuguese territory followed suddenly upon rinderpest in the absence of any regular or recognised system of game preservation. It may be assumed that the extinction of the fly in these territories was due to the sudden and universal application of a process, leading to extinction, that had been working gradually over many years in the west and north of the Transvaal.

As *Glossina pallidipes* and *G. morsitans* both survived, in spite of rinderpest, north of the Zambesi, and *G. pallidipes* survived south of the Maputa, it may be assumed that *G. pallidipes* formerly inhabited parts of the intervening 700 miles of territory, and was not always so isolated as it is to-day in Zululand, and that it was eliminated from the intervening territory by the same process that led to the ultimate disappearance of *G. morsitans* from adjacent Transvaal areas. The process leading to the disappearance of *G. morsitans* from the eastern Transvaal at the time of the rinderpest tended to eradicate *G. pallidipes* in Zululand, but failed, probably because the plant assemblies of Zululand, affording a favourable environment, were relatively vast and successfully harboured a greater food supply. These plant assemblies were game sanctuaries in a land where there was no shooting and where a sustained effort at game preservation had been maintained by the Imperial Government during the period 1887–1897. *G. morsitans* seems unable to accommodate itself to changes of environment following the settlement of fly-country by a population hunting regularly with firearms. The complete eradication of the wild fauna does not appear to be essential to tsetse suppression, but a decided

reduction of it, followed up by constant disturbance of the animals that escape, and to such an extent as to bring about changes of habit and shyness, tend to lead to disappearance of the insect.

Several reports are included as appendices, detailing the history of the occurrence of tsetse in various South African areas.

DUKE (H. L.). **Report on a Tour of Investigation in the Sleeping Sickness Area of Central and South Kavirondo.**—*Uganda Protectorate: Ann. Rept. Bact. Dept. 1923,* pp. 14–23, 1 map. Entebbe, 1924.

The object of this tour was to study the distribution of human trypanosomiasis and the factors determining the persistence and spread of the disease in the Kavirondo infected area of Kenya Colony, where *Glossina palpalis* is the vector of the disease. The localities where the disease has persisted all possess certain features in common—good shelter for tsetse and in consequence a relatively large number of fly. From a study of these foci one is bound to conclude that the prevalence of the disease in any fly area is directly dependent on the degree of contact existing between fly and man. In most parts of the country, *G. palpalis* is only dependent to a limited extent on man for food, other preferred animals being available. Wherever sufficient density of population in the river areas occurs, the disease persists owing to the dependence of the fly on man. In the old centres of disease on the lake shore the shelter is excellent, hippopotamuses, reptiles and birds are abundant, and so, although flies are numerous, they are not troublesome. On the Gwasi coast the disease has disappeared, because when man had been driven away by the disease there was no mammalian reservoir for the trypanosome. No signs of game-animals were seen in any of the fly-areas visited, except a few pig tracks in one locality. Hippopotamus occurs everywhere, but there is no evidence that this animal functions as a reservoir of *Trypanosoma gambiense.* Experience has shown that where ungulates are acting as a reservoir in *G. palpalis* regions, *T. uniforme* and *T. vivax,* both of which develop in the proboscis, are always present in the fly. The absence of a four-footed host in these areas is a very important feature of the problem; the trypanosome depends for its survival on the existence of a certain degree of contact between man and fly, and this is the key to the problem of control. The author considers that there is at present no cause for serious alarm in the persistence of a human trypanosome in these regions, but the potential danger of a recurrence of the conditions conducive to the spread of the disease in epidemic form must not be ignored.

DUKE (H. L.). **Trypanosomiasis Investigations.**—*Uganda Protectorate: Ann. Rept. Bact. Dept. 1923,* pp. 9–11. Entebbe, 1924.

The investigations previously recorded [*R. A. E.*, B, xii, 13] have been continued with trypanosome strains maintained in the laboratory. It has been found that exposure of a strain to prolonged direct transmission leads to the loss by the trypanosome of the power of cyclical development in the fly; at the same time the virulence of the parasite is increased. An antelope strain, obtained in 1920, has now completely lost the power of development in *Glossina,* and, at the same time, its virulence in monkeys and guineapigs has greatly increased. Human

strains are to be subjected to similar investigation during the coming year. Experiments on the transmission of *Trypanosoma congolense* by laboratory-bred *G. palpalis* have already been recorded [*R. A. E.*, B, xii, 29].

Szilady (Z.). **New or little-known Horseflies (Tabanidae).**—*Biologica Hungarica*, i, no. 1, pp. 1–39, 1 pl., 28 figs. Budapest, 10th June 1923.

The new Palaearctic Tabanids, besides a number of new varieties, are *Tabanus strix*, *T. tinnunculus* and *T. albopruinosus* from Mesopotamia, *T. geminus* from Amur, *T. vulpes* from Jerusalem, *T. bromiolus* from Syria and Asia Minor, *T. grandis* from Asia Minor, *T. caucasi* from the Caucasus, *T. arpadi* from Russian Lapland and Amur, *T. cuculus*, *T. appendiculatus*, *T. accipter*, *T. hunnorum* and *T. turkestanus* from Turkestan, *T. goleanus* from Algiers, and *T. ptolemaeanus* from Egypt; *Pangonia argentata* from Syria and Asia Minor, *P. flavocincta* and *P. lucida* from Asia Minor, *P. hannibal* from Spain, *P. villosa* from Tunis, and *P. striata* from Sardinia; and *Haematopota kemali* from Asia Minor, *H. aegyptium* from Egypt, *H. desertorum* from Amur, *H. graeca* from Poros Island, *H. pseudolusitanica* from Portugal, and *H. araxis* and *H. tamerlani* for which no locality is given. A key to the Palaearctic Pangoniini is included.

Bequaert (J.). **Notes upon Surcouf's Treatment of the Tabanidae in the Genera Insectorum and upon Enderlein's proposed new Classification of this Family.**—*Psyche*, xxxi, no. 1, pp. 24–40. Boston, Mass., February 1924.

The contents of this paper are indicated by its title.

Johnson (C. W.). **Notes on** *Muscina pascuorum*, **Meigen, during 1923.**—*Psyche*, xxxi, no. 1, pp. 17–18. Boston, Mass., February 1924.

Very few individuals of *Muscina pascuorum*, Mg. [*cf. R. A. E.*, B, xi, 86] were seen early in 1923 and none during the late spring and summer. A few were taken in the autumn. The scarcity of the fly is thought to be due to the very dry weather and to the consequent absence of the fungi on which it oviposits.

Barber (M. A.), Komp (W. H. W.) & Hayne (T. B.). **Some Observations on the Winter Activities of** *Anopheles* **in Southern United States.**—*Public Health Repts.*, xxxix, no. 6, pp. 231–246. Washington, D.C., 8th February 1924.

Observations made during the greater part of three successive winters are reported on in detail, the information being supplemented by numerous tables, including data of summer observations, which are given for the sake of comparison.

The results are summarised by the authors as follows: In the southern portions of Georgia, Alabama, and Louisiana Anopheline larvae may be found in large numbers in winter. Development of ova, larvae, and pupae continues in winter as in summer, but more slowly. Winter-breeding Anophelines may supplement overwintering adults in the production of the spring supply, and any winter attack on *Anopheles* must be directed against larvae as well as against adults. Aquatic

stages of all the three common species, *A. quadrimaculatus*, *A. punctipennis* and *A. crucians*, occur in winter; those of *A. quadrimaculatus* are the least plentiful. The activities of adults continue in the winter, and there is no true hibernation of any species. Adults are widely dispersed, and no means of destroying them in winter is likely to succeed unless some efficient means is devised of attracting them to places where they can be successfully attacked.

RUDOLFS (W.). **Observations on the Relations between Atmospheric Conditions and the Behaviour of Mosquitoes.**—*New Jersey Agric. Expt. Sta.*, Bull. 388, 32 pp., 6 figs., 6 tables. New Brunswick, N.J., September 1923. [Received 18th March 1924.]

These observations were conducted with females of *Aëdes sollicitans* and *A. cantator*. The results show that there is a close relation between the numbers of mosquitos alighting on the observer and the numbers caught. Temperature at the time of observation is the deciding factor for the activities of the mosquitos; the average daily temperature possibly influences initial activity at the beginning of the day. Activity increases with an increase of temperature up to a certain point and decreases rapidly below 60° F., stopping almost entirely below 50° F. A temperature between 68° F. and 77° F. has the greatest accelerating influence. The influence of wind upon the rate of alighting becomes apparent with a wind velocity between 4 and 8 miles an hour, while the rate of alighting with a wind velocity above 8 miles an hour is constant in spite of increasing temperature, so that wind velocity overcomes the influence of temperature. The number of mosquitos alighting increases with the increase of relative humidity, up to 85 per cent. The percentage caught of those alighting, which is considered to indicate the degree of general activity better than the numbers caught on the wing, increases rapidly with the relative humidities below 75 per cent.; it remains constant from 75 to 85 per cent. and decreases slowly from 85 to 95 per cent. Higher light intensities seem to stimulate the general activities of mosquitos, while extremely high humidities are detrimental.

Studies were also made on attractive and repulsive agents, a report on the former having already been published [*R. A. E.*, B, x, 190]. With an increase of temperature the prospective victims perspire more freely. Some of the intermediate and ultimate decomposition products of sweat are attractive, especially combinations of carbon dioxide and ammonia at a particular temperature and degree of moisture. Temperature increases perspiration, and high relative humidity tends to prevent rapid evaporation, so that these factors increase both the activities of mosquitos and the attractiveness of the persons subject to attack. A high temperature and low humidity cause the applied repellent to evaporate at a faster rate and therefore to be less protective than with low temperature and high humidity.

DYAR (H. G.). **American References in the Catalogue of Indian Culicidae.**—*Insecutor Inscitiae Menstruus*, xii, no. 4–6, pp. 57–60. Washington, D.C., April–June 1924.

Critical notes are given on some incidental references to American mosquitos noticed in a recent catalogue of Indian insects [*R. A. E.*, B, xi, 216].

Shannon (R. C.). **Nearctic Calliphoridae, Luciliini (Diptera).**— *Insecutor Inscitiae Menstruus*, xii, no. 4–6, pp. 67–81. Washington, D.C., April–June 1924.

The North American Luciliini are discussed, and keys to the species are given for each sex. *Francilia alaskensis*, gen. et sp. n. (male only) is described from Alaska, *Lucilia elongata*, sp. n. (female only) from Washington, and *L. pallescens*, sp. n., from North Carolina.

Turner (R. L.). **A new Mosquito from Texas (Diptera, Culicidae).**— *Insecutor Inscitiae Menstruus*, xii, no. 4–6, p. 84. Washington, D.C., April–June 1924.

Aëdes alleni, sp. n., is described from Texas.

Bonne (C.). **Note on** *Culex flavipes*, **Macquart (Diptera, Culicidae).**— *Insecutor Inscitiae Menstruus*, xii, no. 4–6, p. 85. Washington, D.C., April–June 1924.

An examination of the type of *Culex flavipes*, Macq., shows that it does not resemble *C. fatigans*, Wied. (*quinquefasciatus*, Say), with which it has been identified, but is more like *Aëdes nubilus*, Theo.

Dyar (H. G.) & Shannon (R. C.). **Notes on Sabethids from Panama (Diptera, Culicidae).**— *Insecutor Inscitiae Menstruus*, xii, no. 4–6, pp. 85–91. Washington, D.C., April–June 1924.

The larvae of *Wyeomyia* (*Heliconiamyia*) *chalcocephala*, D. & K., *W.* (*Decamyia*) *pseudopecten*, D. & K., *W.* (*Dinomyia*) *phroso*, H., D. & K., *W.* (*Hystatomyia*) *coenonus*, H., D. & K., *W. scotinomus*, D. & K., *W. homothe*, D. & K., and *Sabethinus undosus*, Coq., are described. A table is given for distinguishing the known Sabethid larvae of Panama with a list of the Sabethids not yet known in the larval state.

Dyar (H. G.). **A new Sabethid from Brazil (Diptera, Culicidae).**— *Insecutor Inscitiae Menstruus*, xii, no. 4–6, p. 92. Washington, D.C., April–June 1924.

Wyeomyia mystes, sp. n., is described from Brazil.

Dyar (H. G.). **Note on** *Culex tarsalis*, **Coquillet (Diptera, Culicidae).**— *Insecutor Inscitiae Menstruus*, xii, no. 4–6, pp. 95–96. Washington, D.C., April–June 1924.

The male genitalia of *Culex tarsalis*, Coq., are described. *C. stigmatosoma*, Dyar, which has been confused with it, is treated as a distinct species, but *C. kelloggi*, Theo., is considered to be a synonym of *C. tarsalis*.

Petrocchi (J.). **Estado actual de la Sistemática de los Culicinae (mosquitos) en la República Argentina. Enumeración de especies.** [The present State of Systematics of Mosquitos in the Argentine Republic. List of Species.]—*Rev. Inst. Bact.*, iii, no. 3, pp. 83–93. Buenos Aires, December 1923.

Very little systematic and biological work has been done on the abundant mosquito fauna found in Argentina, where malaria occurs throughout vast areas. A list is given of the 40 species in the collection

of the Bacteriological Institute at Buenos Aires (in October 1922). The nomenclature used by Howard, Dyar & Knab has been adopted, and the list includes eight species of Culicines which are said to be new to science, but are not described though names are assigned to them.

FISHER (H. C.). **Report of the Health Department of the Panama Canal for 1922.**—120 pp., 7 pls. Mount Hope, C.Z., 1923. [Received 17th March 1924.]

An account is given of the anti-mosquito work of the year. A troublesome and extensive breeding-place for *Anopheles albimanus* exists in the form of a lake that is covered with a floating mat of *Chara foliorosa* and other aquatic plants, so dense as to exclude fish and impede the progress of a small boat; this is said to be literally teeming with Anopheline larvae. It was treated with oil sprayed from a barrel pump, which is described and figured. The need for diluting the oil is avoided by heating it to facilitate its passage through the piping and nozzles. In shallow reservoirs, where oiling cannot be practised, the growth is removed from the water by gangs of men dragging it out with boats, but this work has to be done almost continuously. In view of the large new population in the Canal Zone, many of whom are already infected with malaria, the necessity for protecting the residential and industrial centres from Anophelines is obvious. While small breeding-places distant a mile or more from a protected area may be disregarded, it has been fully demonstrated that from extensive breeding areas large invasions of *A. albimanus*, *A. tarsimaculatus*, and other species are to be expected from distances of 2 miles and more.

Anti-plague work has included the erection of many rat-proof buildings. The rats of Panama City were found to have a comparatively high rate of flea infestation, *Xenopsylla cheopis*, Roths., being the predominating species.

HOWARD (L. O.). **Mosquito Observations in different Countries during the past Three Years.**—*Proc. 10th Ann. Meeting New Jersey Mosquito Extermination Assoc.*, pp. 10–25. Atlantic City, N.Y., February 1923. [Reprint received 27th March 1924.]

In view of the appreciation shown as to the value of the author's summary of work in connection with mosquitos up to 1920 [*R. A. E.*, B, ix, 27], the subject is brought up to date by this review of what has been done during the past three years. The value and importance of the work carried out by the New Jersey Mosquito Extermination Association is again commented upon.

MINETT (E. P.). **A Study of some Recent Literature on Malaria Prophylaxis.**—*Brit. Guiana Med. Ann. 1923*, pp. 103–116. Demerara, 1923. [Received 13th March 1924.]

A general review of measures against malaria is given, with particular reference to the difficulty of carrying them out under war conditions. Even under these conditions, however, it is considered that properly planned mosquito-control will prove of greater value than quinine prophylaxis.

Nikolski (V. V.). **Из наблюдений над биологией малярийного комара** *Anopheles maculipennis* **Mg.** [Observations on the Biology of the Malaria Mosquito *Anopheles maculipennis* Mg.]—**Русский Журнал Тропической Медицины** [*Russ. Jl. Trop. Med.*], 1924, no. 2, pp. 41–48. Moscow, 1924.

The five species of *Anopheles* recorded from Russia are : *A. maculipennis*, Mg., *A. bifurcatus*, L., *A. superpictus*, Grassi, *A. hyrcanus*, Pall. (*sinensis*, Wied.) and *A. pulcherrimus*, Theo., the latter occurring only in Turkestan. Only *A. bifurcatus* and *A. maculipennis* occur near Moscow and Petrograd. The foreign literature with regard to the latter is reviewed, and its seasonal history in Russia, and the neighbourhood of Moscow in particular, is discussed.

Konokhov (—). **Новые биологические особенности комаров** *Anopheles*. [New Biological Peculiarities of *Anopheles*.]—**Русс. Журн. Троп. Мед.** [*Russ. Jl. Trop. Med.*], 1924, no. 2, pp. 48–49. Moscow, 1924.

The observations here described were made in 1918 and subsequently confirmed by experiment. Numbers of *Anopheles* were observed hovering over mattresses that had been placed in the sun for disinfection purposes. On closer inspection the mosquitos were seen to be biting *Cimex lectularius* and *Pediculus humanus* (*vestimenti*) as near as possible to the head. This apparently paralyses the victim. The proboscis is then withdrawn and inserted in the back in order to reach the abdomen, from which the entire contents are withdrawn. The attacked insect dies, and the mosquitos having engorged a sufficient quantity of secondhand human blood, fly off to some darkened resting place. Under experimental conditions the mosquitos that had fed in this manner were found to contain malaria plasmodia. It would therefore appear that malarial infection may be spread in spite of the existence of efficient mosquito nets and screens provided that bed-bugs or lice are present from which mosquitos may acquire the infection. Transmission experiments along these lines are being carried out.

Gubin (V. M.). **К вопросу о нефтевании водоемов.** [The Question of Oiling.]—**Русс. Журн. Троп. Мед.** [*Russ. Jl. Trop. Med.*], 1924, no. 2, pp. 53–57. Moscow, 1924.

The abundance of hydrocarbon-digesting bacteria present in stagnant or slowly running waters is probably one of the main reasons for the rapid disappearance of oil films in anti-mosquito work. It is suggested that water should be examined before oiling, and when these bacteria are present, that a bactericide should be added to the oil.

MacGregor (M. E.). **Report on the Anophelinae of Mauritius, and on certain Aspects of Malaria in the Colony, with Recommendations for a New Anti-malaria Campaign.**—48 pp., 2 pls., 33 figs, 4 maps. London [1924].

Though anti-malarial measures have been carried out almost over the whole of Mauritius since Sir Ronald Ross's visit in 1908, much of the work was unfortunately unproductive of useful results. This was

partly due to the fact that no definite plan of action had been laid down, and in consequence many dangerous mosquito breeding grounds were overlooked. The chief reason of non-success, however, would appear to be the lack of essential information regarding the malaria problem. The work was based on the assumption that *Anopheles costalis* was the vector of malaria, whereas the present investigations have shown that *A. funestus* [*R. A.E.*, B, xii, 32] is equally important and in some areas probably the principal carrier. Under certain conditions measures directed against *A. costalis* produce favourable breeding conditions for *A. funestus*.

One of the chief points was to ascertain how *A. costalis* passes the winter, as it disappears from many of the lower inland districts where it occurs in large numbers in the summer [*cf. R. A.E.*, B, x, 106]. The types of the natural and artificial waters adopted as breeding places are discussed. All instars of larvae of *A. costalis* were found in all the breeding places, showing that active development continues even throughout the winter months ; and adults were readily obtained in houses, cowsheds, etc. The breeding places became progressively fewer further inland, the most inland breeding place being found at an altitude of 1,200 feet during the winter months of 1922. Even at the extreme range of inland distribution, active life and reproduction proceeded, though somewhat more slowly in view of the lower atmospheric temperature, which inhibited both larval development and larval food supply. It has thus been definitely settled that hibernation does not take place, and that at its highest inland breeding places this species maintains active life in winter. In the regions above the coastal belts *A. costalis* survives the winter by adopting sheltered " winter-refuges " and with the onset of warmer weather and the wet season it spreads rapidly further inland to the limits of its summer distribution. Since the author's return from Mauritius, he has been informed that *A. costalis* larvae were found at an altitude of 1,800 feet, though this occurrence is considered to be the result of an artificial combination of favourable circumstances supplied by the pools and hoof-marks in the immediate vicinity of a slaughter-house.

A. maculipalpis occurs in particular and restricted sites all round the island and at least as high as 1,200 feet. It is particularly common in the coastal belt on the northern and western sides of Mauritius. Its favourite breeding place is natural seepage water, which forms either large puddles only a fraction of an inch deep, or small shallow pools on a rocky surface. It was also found, but more rarely, in rock holes in river beds and occasionally in small ponds. No preference is shown for shade or sunlight ; the larvae were, however, most often found in sites that received direct sunlight and yet had the shade afforded by pond-weeds and algae.

The original area found infested with *A. funestus* was cleared of it within two days after the beginning of the work preparatory to draining, which consisted of the removal of water-weeds and the subsequent flooding of the water-surface with paraffin castor-oil mixture. This species, however, was found to be much more widely distributed than was at first anticipated, and was easily traced after its peculiar habits had been discovered [*R. A.E.*, B, xii, 32]. The most satisfactory manner of searching for these larvae was to hold a dipper out over the water and to strike at an angle of about 45° in towards the bank at a point from 3–4 inches below the water surface, at the same time forcing the dipper hard against the bank and adjacent vegetation.

In some localities this species outnumbered *A. costalis*. The highest inland altitude at which *A. funestus* was found was 500 feet, where it was found once during the mid-summer months.

The dispersion of *A. mauritianus*, *A. maculipalpis* and *A. funestus* is apparently not very different in the summer and winter, except that the number of breeding places and individuals of all stages increases in the summer, whereas *A. costalis* increases its altitude range from 1,200 feet to at least 1,800 feet.

A. mauritianus and *A. maculipalpis* may be regarded as of negligible importance in the transmission of malaria in the island. Keys are given for the identification of the larvae and adults of the four species. Their life-history and bionomics are also discussed fully. Among the more important factors influencing the periodic fluctuation of mosquitos in Mauritius are temperature and climate. The Anophelines are found in greatest concentration at the end of the summer a few weeks after the rains have ended; this naturally also coincides with a high malaria incidence, as the atmospheric temperature and humidity are also most favourable for the rapid development of the malaria parasite within the mosquito.

The insect enemies of Anophelines in Mauritius include several species of *Notonecta*, *Corixa*, dragonfly larvae, Dolichopodids and larvae of *Lutzia tigripes*. Though larvivorous fish are very abundant and widely distributed, they are not of any great value under natural conditions, but in artificial waters their use has proved very successful. The effluents from sugar factories and the weak soap solution present in streams as a result of washing operations are distinctly inimical to the development of mosquito larvae, and it has since been suggested by Dr. A. Balfour that soap might prove a satisfactory means of checking the larvae in ponds and marshes.

The natural acidity or alkalinity of pure stream waters as determined by indicators of hydrogen-ion concentration [*cf. R. A. E.*, B, x, 25] is considered to be of great value in estimating the likely presence of mosquito larvae in the waters tested. In Mauritius Anopheline larvae were never found in waters showing a reaction below pH of 7.4 (pH of 7.8= neutral), whereas a vigorous larval development occurred where the reactions were distinctly alkaline (pH 8.4—9.5). The principal noxious Culicine species are most frequently found in waters with a distinctly acid reaction, though *Culex fatigans* may very occasionally be found in decidedly alkaline water also.

A list is given of the 21 mosquitos collected in Mauritius, and these include the following hitherto unrecorded species: *Anopheles funestus*, Giles, *Aëdes mascarensis*, MacG., *Culex pipiens*, L., *C. quasigelidus*, Theo., *C. univittatus*, Theo., *C. thalassius*, Theo., *C. rima*, Theo., *C. tritaeniorhynchus*, Giles, *C. univittatus* var. and an unidentified species of *Taeniorhynchus*.

At Rodrigues malaria does not occur [*R. A. E.*, B, xii, 32]; the mosquitos found are *Culex fatigans*, *C. simpsoni* and *Aëdes argenteus*. With future development of ports and landing facilities at Rodrigues the danger of the introduction of *A. costalis* will be increased, so that the clearing of any possible breeding grounds in and around the Port of Mathurin is advised.

The question of an anti-malarial campaign is discussed at length, and detailed suggestions are made for the inauguration of such work, including recommendations for the necessary staff, drainage, and destruction of breeding places of the different species concerned.

Walch (E. W.). **De** *M. sinensis* **als gevaarlijke overbrenger, (een sawah-epidemic).** [*Anopheles hyrcanus* as a dangerous Malaria Carrier (a Rice-Field Epidemic).]—*Geneesk. Tijdschr. Ned.-Indië*, lxiv, no. 1, pp. 1–27, 2 pls., 1 chart. Batavia, 1924. (With a Summary in English.)

In 1919 the author observed an epidemic of malaria, both benign and malignant tertian, of which *Anopheles* (*Myzomyia*) *hyrcanus* (*sinensis*) was the chief carrier, others being also concerned [*R. A. E.*, B, x, 38]. In the present epidemic of the same types of malaria, which occurred in 1922 in a rice-field laid out in 1919, *A. hyrcanus* alone was responsible. It was found to be infected to an extent that in the Dutch East Indies has been known hitherto for *A. ludlowi* only, for in the beginning of the epidemic it had an infection index of 20 per cent. for a fortnight. During one week the number of cysts per infected mosquito was 28. During 3 months, 3,600 *A. hyrcanus* were dissected, with an average infection index of 12. The specimens of *A. hyrcanus* appeared to be of the *vanus* variety. Quinine treatment, under European supervision, gave good results. In 1919 buffalo sheds did not attract the mosquito, but during this epidemic better results were achieved, perhaps because of the larger number of buffalos, 1 to every 20 men. During a period of 2 months in which hardly any mosquitos were found in houses, the following captures were made on 2 buffalos in the sheds: 226 *A. hyrcanus*, 399 *A. vagus*, 297 *A. kochi*, 104 *A. barbirostris*.

The laying out of rice-fields in districts where a ubiquitous mosquito like *A. hyrcanus* can become dangerous should always be carried out under medical supervision.

Bonne (C.). **Remarques sur les** *Cellia* **sud-américaines.**—*Bull. Soc. Path. exot.*, xvii, no. 2, pp. 132–137, 1 fig. Paris, February 1924.

The systematic position of *Anopheles* (*Cellia*) *argyritarsis*, R.-D., *A.* (*C.*) *albimanus*, Wied., and *A.* (*C.*) *tarsimaculatus*, Goeldi, as discussed by previous authors is reviewed, including remarks on the closely allied species *A.* (*C.*) *braziliensis*, Chagas, *A.* (*C.*) *allopha*, Peryassu, *A.* (*C.*) *rondoni*, Neiva & Pinto, *A.* (*C.*) *triannulatus*, N. & P., and *A.* (*C.*) *cuyabensis*, N. & P. The last three appear to be very near to *A. tarsimaculatus*, the chief difference being in the colouration of the hind tarsi. *A. gorgasi* was established as a distinct species on similar characters by Dyar and Knab, but was subsequently treated by them as a synonym of *A. tarsimaculatus*. These modifications of *A. tarsimaculatus* appear to be of more than systematic importance. The typical *A. tarsimaculatus* occurs in Panama, Brazil and the coast of Dutch Guiana, where, as in the interior of Dutch Guiana at Moengo, the majority of specimens show the above mentioned variations in the colour of the tarsi in a modified degree. The habits of those found along the coast also differ greatly from those in the interior. Along the coast the typical *A. tarsimaculatus* may be found in houses, engorged with blood, but not *A. argyritarsis*, which is not found in the neighbourhood of man. In the interior, on the other hand, *A. argyritarsis* occurs in large numbers in houses, and although the variety of *A. tarsimaculatus* breeds in abundance in close proximity to human dwellings, it apparently feeds for preference on cattle, for which purpose it will enter stables, though it only attacks man in the open. Should the minute colour differences as described for this modification of

A. tarsimaculatus from Dutch Guiana indicate the existence of a new biological race, a most careful study of the morphology of this species is necessary.

Charrier (H.). **Le *Stegomyia fasciata* dans la région de Tanger (Maroc).**—*Bull. Soc. Path. exot.*, xvii, no. 2, pp. 137–142. Paris, February 1924.

Aëdes argenteus, Poir. (*Stegomyia fasciata*, F.), was particularly abundant in Tangiers during 1923. Previous records of this mosquito on the north African coast are reviewed, and comparisons are made between the author's observations on its incidence in relation to temperature and those of previous workers. The results show that in Tangiers *A. argenteus* disappears when a mean daily temperature of about 11–12°C. [51·8–53·6°F.] (with a minimum nocturnal temperature of 10°C. [50°F.] or lower) is registered. At 18° [64·4°F.] man is freely attacked, but biting was not observed during the day. Male individuals were frequently found in houses apparently feeding on organic debris. Mating was often noticed both in the evening at lights and in the morning between 8 and 9 o'clock. Darkness is apparently not essential. Details of these observations are given.

The possible danger of the spread of yellow fever with the advent of the air line between Casablanca and Dakar is pointed out, as there is the possibility of the arrival of infected human cases within the first three days of the onset of the disease.

Pavlovski (E. N.) & Stein (A. K.). **Экспериментальные исследования над слюнными железами вшей. II. О действии слюны *Pediculus* на кожные покровы человека.** [Experimental Investigations on the Salivary Glands of Lice. II. The Action of the Saliva of *Pediculus* on the Skin of Man.]—**Вестник микробиологии и Эпидемиологии.**—[*Rev. Microbiol. & Epidemiol.*], ii, pt. 3–4, pp. 77–84, 1 fig. Saratov, 1923. [abridged as] **Sur les causes de l'action des insectes du genre *Pediculus* sur le derme de l'homme.**—*Bull. Soc. Path. exot.*, xvii, no. 2, pp. 143–144, 1 fig. Paris, February 1924.

The extensive experiments with the salivary glands of *Pediculus humanus* (*vestimenti*) and *P. capitis* here described were carried out on similar lines to those previously recorded for *Phthirus pubis* [*R. A. E.*, B, xi, 35]. As in the previous investigations, only the kidney-shaped glands appear to be implicated, the severity of the inflammatory effects of the bites varying with the individual and part of the body bitten; the rôle of the horseshoe-shaped ones in this connection is still uncertain.

Woodcock (H. M.). **On the Modes of Production of "*Rickettsia*"-Bodies in the Louse.**—*Jl. R. A. M. C.*, xlii, nos. 2 & 3, pp. 121–131 and 175–186, 23 figs. London, February & March 1924.

The production of *Rickettsia* bodies in the louse, *Pediculus humanus*, is discussed in further detail, supplementing the author's previous paper [*R. A. E.*, B, xi, 86]. Much of the recent literature is reviewed, and it is concluded that the pathogenic "Rickettsias" are solely products of abnormal haemetaboly and karyolysis of the diseased cells, implying therefore that the actual virus is an abnormal haemetabolic enzyme.

Ewing (H. E.). U.S. Bur. Ent. **On the Taxonomy, Biology and Distribution of the Biting Lice of the Family Gyropidae.**—*Proc. U.S. Nat. Mus.*, lxiii, art. 20, no. 2489, 42 pp., 1 pl., 18 figs. Washington, D.C., 1924.

This paper is a survey of the Gyropidae as a whole. The characters and habits of the family are noticed, and descriptions are given of the sub-families, genera and species, of which 3, 7 and 12 respectively are described as new. The significance of the geographical and host distribution of these lice is discussed.

[Parker] (T.). **The Suppression of Insect Pests and Fungoid Diseases. 5. Bed-Bugs** (*Cimex lectularius*).—*Bull. Bur. Bio-Technol.*, ii, no. 11–12, pp. 91–96. Leeds, October-December 1923. [Received 21st March 1924.]

The life-history and previous work in the control of *Cimex lectularius* are briefly reviewed. Experiments with a proprietary fumigant are described, good results being obtained. Experiments are in progress with a view to finding an effective spray against the bugs hibernating in cracks and crevices [*cf. R. A. E.*, B, i, 61].

Suomalainen (E. W.). **Ueber** *Cimex vespertilionis* **Popp.**—*Notulae Entomologicae*, iii, no. 2, p. 56. Helsingfors, 22nd May 1923. [Received 7th April 1924.]

Cimex vespertilionis, Popp., is recorded from *Vesperugo borealis* in Finland.

Garin (C.). **Fièvre Méditerranéene à Pappataci.**—*Rev. prat. Maladies Pays chauds*, iii, no. 5, pp. 349–358. Paris, January 1924.

A general account is given of sandfly fever, its geographical distribution, aetiology and clinical aspects. The prophylactic and remedial measures are also briefly outlined.

Withycombe (C. L.). **Research in Biology.**—*Trop. Agriculture*, i, no. 3, pp. 45–46. Trinidad, March 1924.

Attention is called to the increasing interest attached to the study of unsuspected sources of disease and to recent discoveries in various fields, especially among invertebrates and the plant kingdom, of reservoirs of human disease, which offer new suggestions for lines of investigation.

Enderlein (G.). **Eine neue blutsaugende Muscide aus Afrika.** [A new Blood-sucking Muscid from Africa.]—*Konowia*, iii, pt. 1, pp. 51–52. Vienna, 20th March 1924.

Haphospatha hirudo, gen. et sp. n., allied to *Stomoxys*, is described from Kamerun.

Ferris (G. F.). **Two Diptera Pupipara from Philippine Bats.**—*Philippine Jl. Sci.*, xxiv, no. 1, pp. 73–78, 3 figs. Manila, January 1924.

Nycteribosca gigantea, Speis., and *Eucampsipoda philippinensis*, sp. n., are recorded from bats in the Philippines.

Zavattari (E.). **Ricerche morfologiche ed etologiche sullo psicodide *Telmatoscopus meridionalis* Eaton.** [Morphological and Ethological Researches on the Psychodid, *T. meridionalis*.]—*Redia*, xv, no. 1–2, pp. 191–235, 1 pl. Florence, 25th February 1924.

The title of this paper indicates its contents. While *Telmatoscopus meridionalis*, Eat., is not a blood-sucking midge, it acts as a sanitary danger signal, as it breeds and thrives in very foul surroundings [*R. A. E.*, B, x, 167].

Pavlovski (E. N.) & Stein (A. K.). **Maculae coeruleae and *Phthirus pubis*.**—*Parasitology*, xvi, no. 2, pp. 145–149, 5 figs. Cambridge, March 1924.

This is an expansion of the information with regard to the action of the salivary glands of *Phthirus pubis*, a preliminary paper on which has already been noticed [*R. A. E.*, B, xi, 35].

Keilin (D.). **On the Life-history of *Anthomyia procellaris*, Rond. and *A. pluvialis*, L., inhabiting the Nests of Birds.**—*Parasitology*, xvi, no. 2, pp. 150–159, 12 figs. Cambridge, March 1924.

The identity of certain species of *Anthomyia* is discussed, the author accepting the view of Rondani, that *A. pluvialis*, L., *A. procellaris*, Rond., and *A. imbrida*, Rond., are distinct species, though the majority of entomologists have confused all of them under the name *pluvialis*. Although these flies are common, very little has been recorded about their mode of life. Old records include the finding of pupae in a bird's nest and the extraction of several larvae and pupae of an Anthomyiid closely allied to *A. pluvialis* from the human ear. A list is given of birds' nests examined by the author and of the insects found in them, which include larvae of *A. procellaris* and (very probably) of *A. pluvialis*, found in 4 out of 14 nests. Although they are saprophagous, these larvae occur only in the nests of birds, showing a case of saprophagous specificity analogous to the specificity of parasites. For the latter, it is already established that they usually occur only in a definite species of host, while for saprophagous animals the general belief still prevails that they may be found in any decomposed substance. The structure of the larva and pupa of *A. procellaris* is described and figured, and the characters by which the larvae of *A. pluvialis* can be differentiated from those of *A. procellaris* are discussed.

To the non-pupiparous Diptera connected with birds listed by Bezzi [*R. A. E.*, B, x, 139] may be added the Sepsid, *Mycetaulus bipunctatus*, and the Anthomyiids, *Lasiomma eriophthalma* and (probably) *L. meadei*, all bred from birds' nests in Britain.

Saunders (L. G.). **On the Life-history and the Anatomy of the early Stages of *Forcipomyia* (Diptera, Nemat., Ceratopogoninae).**—*Parasitology*, xvi, no. 2, pp. 164–213, 3 pls., 26 figs. Cambridge, March 1924.

Attention is drawn to the excellent specific characters differentiating the species of *Forcipomyia* in the early stages, the adults of many genera of Ceratopogonines being notoriously difficult to separate. The author establishes the synonymy of *F. specularis*, Coq., with

F. brevipennis, Macq., and suggests that *F. brumalis*, Long., may be synonymous with *F. bipunctata*, L. The obvious drawback to classification by immature forms is that so few of them are known. The mouth-parts and hypopharynx of the larvae are described in detail and figured for the first time. The larvae live in moist places beneath the rotting bark of fallen trees, in the tap-roots of dead plants, in rot holes in trees, in drying horse and cow manure, decaying fungi and the nests of ants. The immature forms are gregarious. The winter is passed in the third or fourth larval stage, in tap-roots of annuals, etc., but the summer habitat has not been discovered. Pupation occurs with the first warm weather, and the first summer generation is started by the end of May, 3 or 4 generations following. Although furnished with well-developed piercing mouth-parts, the adults of *Forcipomyia* never attack warm-blooded animals. They are known to suck the blood of other insects, and will feed readily on flowers and sweetened material, but the females seem unable to mature their eggs without a meal of blood from their particular host. All attempts to furnish the right host in captivity have failed, and eggs have not, therefore, been obtained, nor have they been found under natural conditions.

A complete investigation into the external and internal anatomy of *F. bipunctata* (the type species) is recorded; other species briefly described with reference only to their specific characters are *F. picea*, Winnertz, *F. radicicola*, Edw., *F. nigra*, Winnertz, *F. brevipennis*, Macq., *F. ciliata*, Winnertz, *F. pulchrithorax*, Edw., *F. braueri*, Wasm., and *F. corticis*, Kieff.

Descriptions by F. W. Edwards of *F. radicicola* and *F. pulchrithorax*, spp. n., are given in an appendix.

KEILIN (D.). **The Absence of Paedogenetic Multiplication in the Blow-fly** (*Calliphora erythrocephala*).—*Parasitology*, xvi, no. 2, pp. 239–247, 3 figs. Cambridge, March 1924.

The following is taken from the author's conclusions :—

Dissections and breeding experiments, involving the examination of 661 larvae, have clearly proved that neither paedogenesis nor polyembryony occur in the larvae of *Calliphora erythrocephala*, and that Parker's assumptions [*R. A. E.*, B, x, 232] must have been derived from faulty experiments. The apparent increase in numbers of the larvae in some of his experiments was due, not to multiplication of the larvae, but to fresh infections of his culture media from external sources.

FERGUSON (E. W.). **Notes on the Nomenclature of Australian Tabanidae : subfamily Pangoniinae.**—*Bull. Ent. Res.*, xiv, pt. 3, pp. 251–263, 1 fig. London, March 1924.

In the first part of this paper, the subgeneric divisions of the genus *Pangonia*, Latr., are dealt with, the status of the names introduced by Walker being fixed as far as possible.

In the second part, notes are given on the synonymy and determination of some of the early described Australian Tabanids, including *Osca maculiventris*, Westw., *O. limbithorax*, Macq., *O. bicolor*, Macq., *O. dorsomaculata*, Macq., and *O. aurata*, Macq. *O. guttipennis*, sp. n., is described from South and Western Australia. A table is given showing the genera in which the species of PANGONIINAE mentioned by Walker have been placed by various authors.

Lloyd (I.I.) & Johnson (W. B.). **The Trypanosome Infections of Tsetse-flies in Northern Nigeria and a new Method of Estimation.**—*Bull. Ent. Res.*, xiv, pt. 3, pp. 265–288, 3 pls., 6 figs. London, March 1924.

In connection with the tsetse-fly investigation in northern Nigeria [*R. A. E.*, B, xi, 117] a new method of rapid estimation of trypanosome infection is described. By means of a dissection that yields the proboscis fully displayed and the important parts of the salivary glands in one preparation, all mature infections of the *vivax* and *congolense* groups of trypanosomes and most of the *brucei-gambiense* group may be discovered.

There is an indication that in at least one of the pathogenic trypanosomes (*Trypanosoma vivax*) an important seasonal variation in the proportion of infective flies (*Glossina tachinoides*) occurs, the mature infections increasing as the rains progress. A comparison of the infectivity of the three prevalent species of tsetse for the country generally is given. *G. morsitans* is much more heavily infected with the main cattle-inhibiting trypanosomes (*T. vivax* and *T. congolense*) than is *G. palpalis* or *G. tachinoides*. The infection in *G. tachinoides* is found to be heavier in spots where the wild ungulates are prevalent than in places where they are scarce. Where *G. morsitans* and *G. tachinoides* range together, the infection in the former is double, or more than double, that in the latter. This is probably because *G. tachinoides* has no special predilection for ungulates as hosts.

Transmission experiments with *G. tachinoides* are described, positive results having been obtained with *T. vivax*, *T. congolense*, *T. gambiense* and *T. brucei*.

Buxton (P. A.). **Applied Entomology of Palestine, being a Report to the Palestine Government.**—*Bull. Ent. Res.*, xiv, pt. 3, pp. 289–340, 9 figs., 5 pls., 1 map. London, March 1924.

Malaria is the principal insect-borne disease of Palestine, and this study, made from May 1921 to August 1923, was primarily to determine which species of *Anopheles* are important in this respect and which are not. The breeding-places of the various species are described in detail. The rural fresh-water breeders consist of 5 species that can be divided into fairly distinct groups: *A. hyrcanus* and *A. algeriensis* breeding in large marshes; *A. elutus* and *A. sergenti* in small marshy spots and stagnant or slowly flowing streams; and *A. superpictus* in streams or, more rarely, in still water. Two other species of this nature, *A. mauritianus* and *A. pharoensis*, are found occasionally. The two remaining species, which are generally found by themselves, are *A. multicolor*, which breeds in salt water, and *A. bifurcatus*, which breeds chiefly in wells and cisterns under and close to houses, but is also sometimes a rural species. The latter is a northern species, attaining the southern limit of its distribution in Palestine, and temperature is probably the factor limiting its occurrence. It is suggested that it normally breeds in cold waters, as in cisterns, caves, etc., and that it can only invade the open waters in winter or when they are heavily shaded. A table, compiled from all breeding records, shows the grouping of the various species of *Anopheles* with each other and with the Culicines. The causes of these associations are unknown, but they are of the greatest importance, because if it were known what prevents a certain species from breeding in a certain place, the discovery might

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lead to a new and potent form of natural control. The occurrence is discussed of certain species in waters of which the hydrogen-ion concentration is indicated. Both *A. superpictus* and *A. elutus* are recorded as being found in patches of *Chara foetida* [*cf. R. A.E.*, B, viii, 61, etc.]. The association of various species is complicated by the fact that they have various seasons of emergence. This question requires further study, but it seems clear that *A. sergenti* is on the wing in autumn, *A. algeriensis* in winter and spring, and *A. superpictus*, *A. elutus* and *A. hyrcanus* in summer and autumn (the first two at least hibernating as adults); *A. bifurcatus* probably breeds at all seasons. A clearly defined succession of generations has not been found in any of the Palestine Anophelines.

The most dangerous of all Anophelines is considered to be *A. bifurcatus*, because of its close association with man; *A. elutus*, *A. sergenti*, *A. superpictus* and *A. multicolor* are all dangerous species, because they are known to enter houses, and the first three at least are closely associated with outbreaks of malaria in Palestine; *A. algeriensis* and *A. hyrcanus* are of little importance, because they remain strictly in the marshes in which they breed. The artificial methods of control directed against the urban *A. bifurcatus* are reviewed, and the problems of dealing with the rural species are indicated [*R. A.E.*, B, xi, 158]. The question of fish as a natural control is discussed, *Cyprinodon* spp. being the most promising.

Notes are given on the anatomy of the larvae and pupae of some of the species, and a key to the Anopheline pupae is included.

A list is given of other Arthropods of medical and veterinary interest, with notes on their bionomics.

THEODOR (O.). **Pupae of some Palestinian Culicines.**—*Bull. Ent. Res.*, xiv, pt. 3, pp. 341–345, 1 map, 3 figs. London, March 1924.

Details of the anatomy of the Culicine pupae of Palestine and a key to them are given, and the points of differentiation from Anopheline pupae are pointed out. The species dealt with are *Culex pipiens*, *C. hortensis*, *C. mimeticus*, *C. laticinctus*, *C. tipuliformis*, *C. perexiguus*, *Uranotaenia unguiculata*, *Theobaldia longiareolata*, *T. annulata*, *T.* (*Culicella*) *morsitans*, *Aëdes argenteus* (*Stegomyia fasciata*), and *A.* (*Ochlerotatus*) *caspius*. *C. tipuliformis* could not be included in the key, because the only pupa available was damaged.

YOUNG (T. C. M.). **Notes on Malaria in Shillong.**—*Indian Med. Gaz.*, lix, no. 3, pp. 117–119. Calcutta, March 1924.

The Anopheline year in Shillong is conveniently divisible into three different seasons—the cold weather, from the cessation of the rains in October until March, during which period *Anopheles gigas* is abundant in clear rocky pools or perennial springs, *A. aitkeni* appearing towards the end of this period in limited numbers; the hot dry months, during which time only the beds of the streams act as breeding grounds, *A. maculatus* being the most prevalent species; and the rainy season, when *A. maculatus* breeds in swampy ground fed by seepage water and springs in the valleys. *A. maculatus* is the most important species in connection with malaria. Though drastic and expensive anti-malarial measures are not considered necessary under existing circumstances, it is advised that sodden ground and swamps should be dealt with by appropriate drainage.

The systematic and epidemiological aspect of the occurrence of malaria in Shillong during 1922 has been dealt with by Shortt [*R. A. E.*, B, xii, 61]. *A. willmori* is here recorded in addition to the species enumerated by him, but *A. minimus* was not found by the author.

STRICKLAND (C.). **Malaria on Ambootia Tea Estate near Kurseong and the Success of some Anti-malarial Operations.**—*Indian Med. Gaz.*, lix, no. 3, pp. 119–121, 1 fig. Calcutta, March 1924.

The tea estate in question lies about 3,000 feet above sea-level, in the Eastern Himalayan foothills. Details are given of a malaria survey undertaken in 1923. The first point considered was whether rainfall had anything to do with the malaria-rate. In general, when a malaria-rate corresponds with a moderate rainfall swamp-breeding Anophelines are incriminated; if such data have an inverse relationship stream-breeders are suspected, as heavy rains scour out the breeding-places and so diminish the sources of malarial infection. A study of the charts showing the rainfall, case-returns and case-rate (number of cases per cent. of population) from 1917 up to date, shows a tendency to inverse correlation, particularly with regard to the data compiled for the period January to May and June to December. The greater the monsoon rainfall in any year the less the case-rate in the epidemic season next year, which proves that on these slopes seepage of subsoil water for months after the monsoon does not occur to any extent. The decomposed micaceous granite soil is so porous that the water flows away through it almost as readily as over it. After the monsoon breaks the great increase of rain in June and July is responsible for a rapid decline of malaria in July and August, proving that the May brood of mosquitos begins to die out by July. When the rains abate rapidly the malaria-rate falls less rapidly. The mosquitos taken on the estate are *Anopheles willmori*, *A. maculatus*, *A. aitkeni*, *A. lindesayi*, *A. barbirostris*, and *A. vagus*. The first two are found everywhere, they are stream breeders, and must be considered to be the carriers of the disease.

The anti-malarial measures carried out are described and prove that the drainage of swamps and training of streams in which the above named species breed, though not affording complete success, are nevertheless effective in reducing the malaria rate more rapidly than would normally occur.

VOINOV (D.) & VOINOV (V.). **Les cellules pigmentaires dans les larves de *Simulium*.**—*C. R. Soc. Biol.*, xc, no. 10, pp. 722–724. Paris, 21st March 1924.

The authors describe pigmentary cells in the larvae of *Simulium*, which form a valuable means of demonstrating peroxydasic enzymes after death.

CHATTON (E.). **Sur un *Leptomonas* d'un Nématode marin et la question de l'origine des Trypanosomides.**—*C. R. Soc. Biol.*, xc, no. 11, pp. 780–783. Paris, 28th March 1924.

Herpetomonas (*Leptomonas*) is considered the most primitive form of Protozoa of the trypanosome type, judging from a comparison of the nature of the hosts, the site of parasitism and the evolutive cycle.

In 1914, a species of this genus was recorded from the marine Gasteropod, *Patella vulgata*, and the author records the discovery of one in 1922 in a marine Nematode. The discovery is yet to be made of herpetomonads in marine animals having no contact with the earth.

STOCK (P. G.) & MONIER-WILLIAMS (G. W.). **Preliminary Report on the Use of Hydrogen Cyanide for Fumigation Purposes.**—*Min. Health: Repts. on Pub. Health & Med. Subjects*, no. 19, viii + 84 pp., 17 pls., 8 figs. London, H.M.S.O., Price 2s. 6d. 1923.

In an introduction by G. Newman it is pointed out that the advantages of hydrocyanic acid gas as compared with sulphur for the destruction of rats and other vermin on board ship are saving of time, absence of danger from fire and of damage to metal work, cargo, etc., and probably less expense. Although this method is in general use in the United States and is practised in Australia and European countries, it has not been readily adopted in Great Britain owing to the deadly nature of the gas and the risks incurred in dealing with it. It is essential that only trained personnel should be employed for its use, and effective respirators must be used by all operators. As a greater safeguard, it is believed that the admixture of another gas, which gives greater warning of its presence, would be practicable, and a cyanogen chloride mixture seems to answer this purpose, but is still on its trial. Liquid hydrocyanic acid has also been used, but the difficulty with this preparation is chiefly that of transport.

The report describes the generation of the gas, the apparatus used and the methods of dissemination, and the general fumigation of a ship. The necessary precautions against accidents are dealt with, and the best type of protective masks are described.

In a number of appendices are given the regulations in force in various countries in regard to fumigation practices.

FERGUSON (E. W.). **Report of the Microbiological Laboratory on work in connection with the Plague Outbreak of 1921–1922.**—*Rept. Director-Gen. Pub. Health, N.S.W. 1922*, pp. 41–52. Sydney, 1924.

In the course of this report, the flea prevalence during the plague period from 1st September 1921 to 31st July 1922 is recorded from daily examination of rats and collection and identification of fleas. The species commonly occurring on rats in Sydney are *Xenopsylla cheopis*, *Ctenopsylla musculi* and *Ceratophyllus fasciatus*. The relative proportion of occurrence of these species over a period of 14 years is 47·7 per cent., 34·4 per cent. and 17·7 per cent. The annual charts show that the maximum incidence of *X. cheopis* is reached about February, while that of *C. musculi* is generally about September. During the plague period under consideration, there was an unusual rise in the numbers of both *C. musculi* and *X. cheopis* in June and July 1921, followed by a drop in August and September. In November there was a slight rise for all 3 species, followed by a drop in December, the numbers of *X. cheopis* suddenly rising again to a maximum in January, after which there was a gradual fall to the end of the plague period.

Ishimori (N.). **Sur l'immunisation des Chenilles.**—*C.R. Soc. Biol.*, xc, no. 12, pp. 843–845. Paris, 4th April 1924.

A series of experiments are described showing that immunisation can be acquired against the cholera vibrio but cannot be produced against *Bacterium galleriae* in larvae of *Galleria mellonella*. This may be explained by the fact that *B. galleriae* is not liable to be phagocytosed.

Chagas (C.). **Infection naturelle des Singes du Para** (*Chrysothrix sciureus* **L.**) **par** *Trypanosoma cruzi*.—*C.R. Soc. Biol.*, xc, no. 12, pp. 873–876, 4 figs. Paris, 4th April 1924.

Trypanosoma cruzi has been isolated from the monkey *Chrysothrix sciureus* from Para. This record from northern Brazil is from a region where the human infection has not yet been recorded. The discovery of an additional wild host [*cf. R.A.E.*, B, vii, 141] is important, but further observations are necessary in order to prove whether the trypanosome is pathogenic to this host and to ascertain the intermediate one.

de Gedroyc (M.). **L'influence de la lymphe des Insectes sur le microbe de la rage.**—*C.R. Soc. Biol.*, xc, no. 12, pp. 906–907. Paris, 4th April 1924. Also in *Polskie Pismo Ent.*, ii (1923), pt. 4, pp. 196–199. Lemberg, 1924.

The results of the experiments described prove the immunising value of the lymph of *Deilephila euphorbiae* and its influence on the micro-organism of hydrophobia. The larval lymph destroys these micro-organisms *in vivo* within 24 hours, but injections of infected lymph into rabbits did not produce the expected immunity.

[Olsufev (G. V.).] **Олсуфьев (Г. В.).** *Silphopsyllus desmanae*, **gen. et sp. n. (Coleoptera, Leptinidae) паразит выхухоли.** [A Parasite of the Musk-rat.]—**Русское Энт. Обозрение** [*Rev. Russ. Ent.*], xviii, no. 2–3, pp. 81–90, 8 figs. Petrograd, 1923. [Also in French.] [Received 12th April 1924.]

A brief review is given of the family Leptinidae, with a key to the genera. *Silphopsyllus desmanae*, gen. et sp. n., was found on musk-rats (*Desmana moschata*) at Penza, Russia. Nothing is known of the biology of this ectoparasitic beetle. Its habits are similar to those of fleas, inasmuch as it buries itself in the thickest part of the fur of the host.

[Pavlovski (E.) & Stein (A.)]. **Павловский (Е.) и Штейн (А.). Taches bleues et glandes salivaires du** *Phthirius inguinalis* **L.**—**Русское Энт. Обозрение** [*Rev. Russ. Ent.*], xviii, no. 2–3, pp. 95–98. Petrograd, 1923. [Received 12th April 1924.]

This information with regard to the action of the salivary glands of *Phthirus pubis* (*inguinalis*) on the human skin has already been noticed from another source [*R.A.E.*, B, xi, 35; xii, 83].

Christeller (E.). *Crataerhina pallida* **Oliv.**—*Zeitschr. wiss. Insektenbiol.*, xix, no. 4, p. 103. Berlin, 25th April 1924.

Crataerhina (*Oxypterum*) *pallida*, Latr., is known as a parasite of the swift. In 1918 this Hippoboscid caused great annoyance indoors at Leipzig, and an instance is here recorded in which the author was himself bitten by it.

Georgevitch (J.). **Нова испитиваъа на Голубаукој мущичи, Ъживојина одорЂевиЂа.** [Further Researches on *Simulium columbaczense*.]—**Глас српске краљевске акад.** [*Jl. Serbian Royal Acad.*], cvii, no. 1, pp. 61–74. Belgrade, 1923. (With a summary in French.)

This paper has already been noticed from another source [*R.A.E.*, B, xi, 139].

[Nikolski (V.).] **Никольский (В.). Переносчики тропических болезней наших хлопковых районов и способы защиты от заражения. 1. Кожный лейшманиоз или "восточный прыщ"—пендинка—и новые проблемы в изучении способа заражения этой болезнью.** [Carriers of Tropical Diseases in our Cotton Regions and Methods of Protection from Infection. 1. Dermal Leishmaniasis or "Oriental Sore"—and new Problems in the Study of the Mode of Infection with this Disease.]—**Хлопковое Дело** [*Cotton Indust.*], iii, no. 1–2, pp. 58–70, 2 figs. Moscow, January–February 1924.

Oriental sore is of widespread occurrence in the cotton-growing regions of Turkestan and the Caucasus, but very little has been done in Russia with regard to the study of the causal and transmitting agents. The recent development of this work in other countries is reviewed. A general account is given of the life-history and habits of *Phlebotomus* as well as of the remedial measures that have been recommended against it. Keys are given to the European and Asiatic species of the genus. Turkestan is particularly adapted for the investigation of these problems, as over a comparatively small geographical area varied conditions may be found, such as abundance of both the disease and the vector, abundance of the vector with limited occurrence of the disease, as, for instance, in Tashkent, and the apparent existence of the vector in the absence of local infection.

Wolcott (G. N.). **Insectae Portoricensis** [*sic*]. **A Preliminary Annotated Check-list of the Insects of Porto Rico with Descriptions of some new Species.**—*Jl. Dept. Agric. Porto Rico*, vii (1923), no. 1, 313 pp., 2 pls. Rio Piedras, P.R., 5th March 1924.

An attempt is here made to summarise the records in literature of the occurrence of insects in Porto Rico. A bibliography of the general papers and economic papers dealing with insects of several orders is given separately. The blood-sucking insects include 6 fleas, *Cimex lectularius*, L., 3 Simuliids, 2 Tabanids, 4 Hippoboscids, and 14 mosquitos, of which the more important are *Anopheles albimanus*, Wied., *A. grabhami*, Theo., *A. punctipennis*, Say, and *Aëdes* (*Stegomyia*) *argenteus*, Poir. (*aegypti*, L.).

Holden (C. W.). **The Prevention of Malaria with a Division in the Field.**—*Jl. R. A.M.C.*, xlii, no. 4, pp. 259-265. London, April 1924.

The work described was carried out during 1918 in Macedonia. It was divided into two groups, the first covering all personal measures, such as the use of mosquito nets, screens and repellents, and the second including anti-mosquito measures, such as the destruction of the larvae, etc. For this work the experiments of Mayne with cresol as a larvicide were of great value; his conclusions are briefly quoted [*cf. R.A.E.*, B, viii, 90, 190]. One great advantage of treatment with cresol over oiling is that it does not deter the mosquitos from ovipositing in the treated water. Further advantages are that reeds and algae need only be cleared where they are very dense. The treated water remains free from larvae for about 14 days. During the campaign under discussion cresol was added at the rate of one ounce to every 100 cubic feet of water once a week.

Lomhelt (S.). **The Danish Treatment of Scabies.**—*Jl. R. A.M.C.*, xlii, no. 4, pp. 287–290. London, April 1924. [Reprinted from *The Lancet*.]

This treatment of scabies in man by means of ointment was first used by Ehlers in Denmark in 1911, and in view of the success of subsequent trials it has now been adopted as the standard treatment in the British Army.

A certain amount of care and practice are necessary to obtain perfect results in the preparation of the ointment, details of which are as follows: 1 kilogramme of sublimated sulphur is dissolved at a gentle heat in 2 kg. of a 50 per cent. solution of potassium hydroxide. This makes a clear, yellow solution.

225 grammes of vaseline and 225 grammes of water-free lanoline are carefully mixed, without heating. To this mixture 375 grammes of the solution of sulphur mentioned above is added. Fresh zinc hydroxide is made by mixing 28 grammes zinc sulphate and 40 grammes 20 per cent. sodium hydroxide, and this is afterwards added to the ointment. Liquid paraffin is added to obtain a total weight of 1,000 grammes, and 5 grammes of benzaldehyde is added to check the smell of sulphuretted hydrogen.

The activity of the ointment depends on the high sulphides of potassium, a production of sulphuretted hydrogen taking place when the ointment is placed upon the skin.

A single application of this ointment is sufficient, the patient being cured after 24 hours, and relapses do not occur.

Atkins (W. R. G.). **The Hydrogen Ion Concentration of the Soil and Natural Waters in Relation to Diseases other than Bacterial.**—*Parasitology*, xv, no. 2, pp. 205–210. Cambridge, June 1923.

It is possible that the work of MacGregor [*R.A.E.*, B, x, 25] may eventually throw some light on the puzzling rarity of malaria in the neighbourhood of the Agricultural Research Institute, Pusa (India). The water of the local river is distinctly alkaline, but although mosquitos, including, it is said, *Aëdes argenteus* (*Stegomyia fasciata*), are abundant, malaria is rare and of a mild type. No evidence of conveyance of the disease from imported cases can be obtained, and

it is obvious that the necessary Anopheline carrier is rare or absent. The suggestion is made that the carrier of the disease may require an acid environment, which is not easily obtained in a district so well cultivated, where dead trees are rapidly used for fuel, and where the water of soil and river is markedly alkaline.

Lower Egypt is also remarkably free from malaria, and it is significant that much of the coastal region has brackish alkaline subsoil water. Malaria was formerly prevalent round the fresh-water canal at Ismailia, but has now been stamped out.

There appears on the whole to be a certain amount of evidence connecting the prevalence of malaria with the existence of acid water for the development of the larvae of certain species. It is known, however, that *Anopheles maculipennis* and *A. bifurcatus*, breeders in alkaline water, can transmit malaria; although this fact does not support the hypothesis concerning the distribution of malaria that has been advanced above, it is possible that the salinity, and, perhaps in an indirect manner, the oxygen content of the water may each contribute something in regulating the distribution of mosquitos.

Eckstein (F.). **Zur Entdeckungsgeschichte der Malaria.** [The History of the Discovery of Malaria.]—*Zool. Anz.*, lviii, nos. 3–4, 5–6, 7–8, pp. 83–97, 137–148, 213–227. Leipzig, 5th & 20th January, 5th February 1924.

The contents of this paper are indicated by its title.

Ter Poorten (F. H.). **Some Remarks on *M. ludlowi* and on the Fight against this Mosquito.**—*Repts. Dutch-Indian Med. Civil Service*, 1924, pt. 1, pp. 99–114, 7 pls. Batavia, 1924.

The specimens of *Anopheles ludlowi* taken in the littoral area (brackish water zone) of Surabaya in 1923 were characterised by a darker pigmentation of the wing. The anomaly is described and figured. This darker type is less susceptible to malarial infection than the common type and also transmits the infection to man to a less degree. When selecting its breeding-places, the chief attraction for *A. ludlowi* is the proximity of man, and in that case it may breed in dirty or in fresh water. In the search for blood it can cover distances of over a mile. *A. subpictus* (*rossi*) also flies considerable distances to obtain blood, and probably also for breeding purposes, if no rural brackish pools occur in the neighbourhood. Even if the adaptation of *A. ludlowi* to fresh-water does not appear to be definite, measures against it must include the clearing of all collections of water in a littoral area.

Grassi (B.). **Nuovi contributi alla biologia degli anofeli.** [New Contributions to the Biology of Anophelines.]—*Atti R. Accad. Naz. Lincei*, Rend. Classe Sci. fis. matemat. e nat., xxxii, pp. 373–375. Rome, 22nd April 1923.

In North Italy (Venetia and Tuscany), *Anopheles maculipennis* (*claviger*) and *Culex pipiens* were abundant in dwellings, especially in dark situations, from September onwards. All the specimens were non-biting females with developed fat-bodies. None were found in pigsties in Tuscany and only a few in Venetia, which latter

also were females with developed fat-bodies. It is concluded that early in November *A. maculipennis* has retired to hibernate in dark and rather dry places with a medium temperature and protected from wind and rain. Nearly all—if not all—have fattened in animal quarters ; no human blood was found, even in three engorged specimens taken in September in Venetia.

Observations made in Bavaria in August and in Italy in September show that fattening in place of egg maturation is related, not to a fall of temperature, but to a given period of the year, and that this period and the amount of fattening vary with the locality and the species concerned. In early winter such fattening occurs in places (such as densely occupied and well-closed stables) warmer than those in which in March or April eggs mature rapidly in hibernated individuals or in newly-emerged ones. Furthermore, in December, 1921, three Anophelines with developed fat-bodies were found with nearly mature malarial amphionts—a fact indicating that fattening must have occurred in a somewhat warm place, presumably in the stables where these specimens were captured.

Other observations show that more than one meal is needed to develop the fat-bodies, at least in Central Italy. This point was left in doubt in a previous paper [*R.A.E.*, B, ix, 167].

Regarding the distinction between "hibernation" and "semi-hibernation," the author defines as hibernating individuals those that have developed fat-bodies, but are empty of blood. There is, however, a difference between the hibernating Anophelines of North Italy and those of Central Italy, the latter having less developed fat-bodies than the former.

GRASSI (B.). **Nuovi contributi alla biologia degli anofeli.** [New Contributions to the Biology of Anophelines.]—*Atti R. Accad. Naz. Lincei*, Rend. Classe Sci. fis. matemat. e nat., xxxii, pp. 438–442. Rome, 6th May 1923.

In North Italy non-hibernating Anophelines are rare in mid-winter, but around Rome semi-hibernating individuals are more numerous than hibernating ones. Semi-hibernating individuals may be divided into 3 groups:—(1) without developed fat-bodies, with small eggs like those in newly emerged females, with digestion either half-completed or nearly completed, or containing no blood ; (2) with developing fat-bodies, eggs as in group 1, and either engorged or with digestion half-completed or nearly completed, or containing no blood ; (3) with half-developed eggs and half-developed digestion, or nearly-completed digestion, or containing no blood.

In December and January the percentage of engorged individuals falls considerably ; individuals with empty alimentary canals and with undeveloped fat-bodies are still numerous (these have probably fed, but an enhanced metabolism due to environment has prevented fattening) ; there is a larger number of semi-fat individuals with small eggs ; and there are no (or only a very few) individuals with half-digested blood and with developing eggs or mature eggs.

The developed fat-bodies in individuals captured in Venetia in November and brought to Rome decreased there by December. In the locality where the specimens were captured, individuals with developed fat-bodies were still present about two months later, so that the loss of fat was premature. It is notable that some of the specimens

became fat again after having fed. Several experiments seemed to prove that in the prematurely thinned individuals the development of the eggs occurs more easily in January and December, but that this is pathological. It is only early in February that the eggs mature normally ; this maturation requires some meals.

As pointed out, the fattening limited in Central Italy to some individuals is general in North Italy and lasts longer there. This is attributable—at least partly—to the colder temperature. From this aspect, fattening may be looked upon as a secondary phenomenon. The author does not consider, however, that in Central Italy only fattened individuals (true hibernators) succeed in surviving the winter and in depositing normal eggs, whereas thin or half-fattened individuals (semi-hibernators) die before February.

The author does not agree with Roubaud that the winter inactivity of female mosquitos and suspension of reproductive activity is due to an intoxication of the organism and ends after an excretory purification [*R.A.E.*, B, xi, 162].

GRASSI (B.). **Pesci nostrali antimalarici.** [Italian larvicidal Fishes.]—*Atti R. Accad. Naz. Lincei*, Rend. Classe Sci. fis. matemat. e nat., xxxii, pp. 511–513. Rome, 20th May 1923.

The conclusion reached in this review of the various attempts made in Italy to use indigenous fishes against mosquitos is that little can be expected from these species. Two exotic species, *Girardinus poeciloides* (millions) and *Gambusia affinis* (top minnow) are worthy of tests on a large scale.

GRASSI (B.). **Acclimazione delle Gambusie in Italia.** [The Establishment of *Gambusia affinis* in Italy.]—*Atti R. Accad. Naz. Lincei*, Rend. Classe Sci. fis. matemat. e nat., xxxii, pp. 544–548. Rome, 1st June 1923.

Tests with *Gambusia affinis*, brought to Rome from Spain in July 1922, seem to indicate that this fish may prove of real value in destroying mosquitos in Italy, but it is unable to penetrate dense aquatic vegetation, and frogs prey upon it.

GRASSI (B.). **Se i reperti di semilune siano sufficienti per spiegare l'epidemiologia delle febbre estivo-autumnali.** [Whether Crescent Findings suffice to explain the Epidemiology of malignant tertian Fevers.]—*Atti R. Accad. Naz. Lincei*, Rend. Classe Sci. fis. matemat. e nat., xxxii, pp. 583–587. Rome, 17th June 1923.

The author has been forced to the conclusion that in the present state of knowledge of the epidemiology of malignant tertian malaria (in view of the fact that many primary cases of the disease occur at a time when cases harbouring gametes are rare) it is necessary to admit either that infection occurs independently of mosquitos or that the malarial parasites are not three distinct species (or at any rate can interbreed). The first alternative being negatived by

known facts there remains only the second. Possibly under certain conditions the parasites—all of one species—pass from one form to another as Golgi originally supposed was the case. Golgi suggested that in exceptional instances young forms derived from the crescents may develop and thus become invested with the character and significance of the parasites with cycle development, which is peculiar to benign tertian and quartan. As an alternative to this theory the author suggests that there may occur frequent phenomena of hybridisation between the various species of parasites. He has observed *in vitro* the fertilisation of a benign tertian [*Plasmodium vivax*] female gamete by a malignant tertian [*P. praecox*] male gamete or flagellated body. It is therefore possible that both pure and hybrid species occur. The presence of such hybrids may perhaps explain the occurrence of malignant tertian malaria. From this point of view all transmission experiments made hitherto are inconclusive. It is necessary to use carefully chosen subjects at the period when malignant tertian fevers occur without the Anophelines being able to find sufficient crescents to become infected. Many cases of primary infections will have to be produced and followed for a long time.

Grassi (B.). **Sull'** *Anopheles elutus.* [On *A. elutus.*]—*Atti R. Accad. Naz. Lincei*, Rend. Classe Sci. fis. matemat. e nat., xxxiii, no. 6, pp. 207–209, 1 fig. Rome, 16th March 1924.

One of the characters given by Edwards [*R.A.E.*, B, x, 18] for distinguishing *Anopheles elutus* from *A. maculipennis* (*claviger*) was the absence of float-cells in the eggs of the former. The author found females in Italy in 1923 that deposited such eggs. Of three specimens of *A elutus* obtained for comparison from Palestine one laid eggs without floats and two laid eggs with floats, which were, however, notably smaller than those of *A. maculipennis*. Similar corroborative finds were then made in Palestine. The author considers it doubtful whether the two species are actually distinct.

Molloy (D. M.). **Some Personal Experiences with Fish as Anti-mosquito Agencies in the Tropics.**—*Amer. Jl. Trop. Med.*, iv, no. 2, pp. 175–194, 6 figs. Baltimore, Md., March 1924.

Previous references to the use of fish against mosquito larvae are reviewed, and the author's personal experience in Nicaragua is described. *Poecilia sphenops*, a fish of great value in Nicaragua, is found throughout Central America both in tidal waters and mountain streams. It is hardy and stands transportation well.

During the yellow fever campaign in 1919 all wells and other artificial water containers were restocked with this and other fish, and the disease, which was already on the wane, disappeared. The malaria rate was also greatly reduced.

Among the chief factors to be considered in using fish for mosquito control are the number of fish present in a given area and amount of available food-supply. In the case of limited food-supply the fish will surmount almost any barrier such as vegetation, etc., to get at the most remote mosquito breeding place. Examples of this type of natural control existing in Nicaragua are described. By assisting

the fish (brushing and cleaning the edges of the ponds and streams) mosquito control could be made almost absolute so far as artificial ponds and streams are concerned.

BRADLEY (G. H.). U.S. Bur. Ent. **The Natural Breeding Places of *Anopheles* Mosquitoes in the Vicinity of Mound, Louisiana.**— *Amer. Jl. Trop. Med.*, iv, no. 2, pp. 198–215, 4 pls., 1 map. Baltimore, Md., March 1924.

The various breeding places encountered are described. The highest rate of Anopheline breeding was found in the broad, shallow lakes, where it was also found to be most constant throughout the season. Next in importance are the natural bayous—the sluggish streams that are the old spillways of the Mississippi river formed during the overflow seasons before the days of the levee system.

The largest amount of breeding is in the natural waters, and it is greatly diminished wherever the vegetation has been cleared.

Lists of the plants growing in and near the waters of these areas are given, with notes on some of them.

BARBER (M. A.). **The Effect of *Chara robbinsii* on Mosquito Larvae.**— *Pub. Health Repts.*, xxxix, no. 13, pp. 611–615. Washington, D.C., 28th March 1924.

In view of the conflicting reports regarding the value of *Chara* spp. against mosquito larvae (which have been noticed from time to time in this *Review*) observations were made in Louisiana on *Chara robbinsi*, which appeared in large amounts in rice plots at an Experiment Station. The plant was fruiting freely, had a strong odour and was often so thick as to form mats at the surface of the water; larvae of *Anopheles* and of various Culicines were found everywhere in the presence of the plant, pupae and larvae of all sizes being especially abundant where the matted plant extended slightly above the surface of the water. Anopheline larvae were also plentiful in ditches where it was very thick and also in various other rice fields in the neighbourhood. Many laboratory experiments were made in aquaria containing various amounts of this plant, both fresh from the field and kept for weeks in the container. Anophelines developed well in them all, and in many experiments were reared from egg to adult, provided that sufficient food was supplied. Rearing was also successful in an extract of green *C. robbinsi* crushed in a mortar and in one of the dried, powdered plant. Washed and crushed oöspores of it were ingested by the larvae without any apparently harmful result. Food and temperature conditions being equal, there seemed to be no difference between the rate of growth of Anopheline larvae in aquaria containing the *Chara* and those containing other plants. In cultures in which it remained green and freshly growing, larvae often developed slowly or died out, provided that their food supply was not supplemented, but if small quantities of rotted *Chara*, *Spirogyra*, or any decomposing plant were placed within reach of the larvae, they throve in spite of the presence of green *Chara*. A mixture of living and rotting *Chara* proved to be such a good culture medium that it was used as a routine for developing mosquito larvae. Another genus of Characeae, *Nitella*, of which

N. gracilis and *N. tenuissima* occur in rice fields and ditches in this region, showed no toxic effect on mosquito larvae. It is evident therefore that whatever larvicidal power may be possessed by some species of *Chara*, it is not common to the whole genus, and in any test of its power the food requirements of the larvae should be taken into consideration.

LENERT (L. G.). **Mosquito and Malaria Control.**—*Cal. State Bd. Health*, Bull. 44, 41 pp., 20 figs. Sacramento, Cal., 1924.

This is a valuable compilation, in a popular form, of knowledge concerning the mosquitos of California and their relation to disease, particularly malaria. The life-history and habits of the mosquitos are described, and the usual remedial measures, such as oiling, draining and the use of fish are discussed. A key is given for the determination of the adult females of the commoner mosquitos of California, and the text of the Mosquito Abatement Act of 1915 is quoted verbatim.

HEARLE (E.). **La lutte contre les moustiques à Banff, Alberta.**—*Nat. canad.*, 1, no. 9, pp. 210–213. Quebec, March 1924.

The information contained in this paper has already been noticed [*R.A.E.*, B, xi, 139].

CONNAL (A.). [**Mosquitos.**]—*Ann. Rept. Med. Res. Inst. 1922*, pp. 24–27. Lagos, 1923.

Daily inspection of the houses in the Lagos area during 1922 resulted in the finding of the following mosquito larvae: *Aëdes argenteus* (*Stegomyia fasciata*), which greatly outnumbered all the others put together, *Culex* (*Culiciomyia*) *nebulosus*, which was also abundant, and *Culex fatigans*, *Anopheles costalis*, *Culex decens* and *C. thalassius*, which were scarce, the last two being found only once. *A. costalis* and *C. nebulosus* were sometimes found in company with *Aëdes argenteus*: household receptacles were the commonest breeding-places. Experiments proved that a female of *A. argenteus* could produce fertile eggs for 31 days after removal of the male.

A list is given of blood-sucking insects received for identification.

KIRK (H. B.). **Notes on the Mating-habits and early Life-history of the Culicid, *Opifex fuscus*, Hutton.**—*Trans. N.Z. Inst.*, liv, pp. 400–406, 3 figs. Wellington, 14th December 1923.

Larvae, and often a few pupae, of *Opifex fuscus* are to be found in pools throughout the winter. In mild winters a few individuals may emerge. During September pupation occurs rather more freely; pairing takes place among the newly-emerged insects, but it is not usually until October that it is in full swing. The pairing habits are fully described. A newly emerged pair were kept under observation

from the 7th March, and on the 10th several eggs were found and deposition continued until the 19th. The minimum incubation period varied from 8 to 14 days, but hibernation may take place in the egg stage. The first moult occurs about 3 weeks after hatching, but the time varies greatly. The second moult in hibernating larvae in the laboratory was about the end of August or a little earlier; pupation began the first week in September and the first adult appeared on the 17th. It is probable that the normal life of the adult is short, though both sexes have lived over 3 weeks in captivity. A striking feature is the apparently capricious preference given to certain pools, some being always occupied, while others, which appear equally suitable, are either not occupied, or occupied in some years and not others.

ANDERSON (J.). **Filariasis in British Guiana.**

VEVERS (G. M.). **Addendum on Filaria Carriers and a List of Mosquitoes.** —*London Sch. Trop. Med.*, Research Memoir Series, v, no. 7, 122 pp., 23 pls. London, 1924.

Practically one-fifth of the population of British Guiana harbour *Filaria bancrofti*, the infection being largely urban in distribution. *Culex fatigans*, Wied. (*quinquefasciatus*, Say) is the vector. Infestation by *F. bancrofti*, *per se*, produces no symptoms; all the pathological manifestations associated with filariasis are due to secondary infection by pyogenic organisms, and it is suggested that the adult filariae, living and moving about in the lymphatic system, prepare the ground for bacterial invasion. In a tropical country like British Guiana where streptococci, abrasions of the skin and mosquitos are common, and where the general filarial rate is high, the serious incidence of acute septicaemia might thus admit of reasonable explanation. The total eradication of the disease can be effected only by a prophylaxis involving the complete banishment of the vector from the dwellings of the people. Suitable prophylactic measures are mosquito screening, pipe-borne water supplies, modern sewage disposal, co-operative draining of coast-lands, and the vigorous application of ordinary anti-mosquito measures.

In the addendum, Dr. Vevers states that in 1921 a number of feeding experiments on human cases of *F. bancrofti* were made, using *Aëdes argenteus*, Poir., as the mosquito intermediary. This species was as plentiful as, and at some seasons even occurred in larger numbers than, *C. fatigans*, Wied., the common carrier of filariasis in the Guianas and West Indies. Moreover, the female feeds until 10 or 11 p.m., although commonly supposed to be a day-feeding mosquito. The specimens used were bred from the egg to preclude previous infection. Filarial larvae were only found in 2 out of 44 mosquitos, *viz.*, in those killed on the 6th and 19th day after feeding. In both these cases no development had taken place, the microfilariae had merely lost the sheath and migrated to the thoracic muscles. This confirms Low's original work in 1901, proving that *A. argenteus* is an unsuitable host for *F. bancrofti*.

A tour of inspection showed the aboriginal Indians in north-west British Guiana to be free from elephantiasis. *Filaria ozzardi* and *F. perstans* occur commonly among the aborigines. In the case of

one family of seven, all of whom were heavily infected with the microfilariae of *F. ozzardi* (which has previously been shown not to be carried by various mosquitos and fleas), the palm hammocks were found to be infested with the bed-bug, *Cimex hemiptera* (*rotundatus*). The hammocks of the two other families, which did not exhibit microfilariae, were quite free from bugs. No lice were found among these three families. Dissection of about 20 of the bugs failed, however, to reveal infection, but this negative result is not regarded as conclusive proof that *Cimex* is not a carrier.

A list is given of the mosquitos collected in British Guiana.

SWEET (W. C.). **The Periodicity of** *Microfilaria bancrofti* **in Brisbane.** —*Health*, ii, no. 2, pp. 42–46. Melbourne, March 1924.

From a study of the periodicity of the microfilariae of *Filaria bancrofti* in Brisbane the most accurate results for the diagnosis of filariasis should be obtained from slides taken between 8 p.m. and 6 a.m., those taken from the finger being better than those from the ear.

In one case higher figures were obtained during the daylight hours after the patient had been on night duty. A cycle taken from the same patient a week after he had returned to day duty showed that the microfilariae in his peripheral blood had returned to a great extent to the usual distribution, except that they continued to be found at a somewhat later hour in the morning. These results suggest that the microfilariae in the blood respond quickly to change in habits, more particularly to changes in sleeping habits.

The usual vector of *F. bancrofti* in Brisbane is *Culex fatigans* (*quinquefasciastus*) a night-biting mosquito, the only species biting by day being *Aëdes argenteus* (*Stegomyia aegypti*). Certain work, as yet unpublished, indicates that the latter species cannot be a vector of filariasis.

Although no conclusions can be drawn from this one instance, it is suggested that the periodicity is due to some other factor than the biting habits of mosquitos, there probably being a greater correlation between sleep and periodicity than between mosquitos and periodicity.

COOLING (L. E.). **On the Protracted Viability of eggs of** *Aëdes aegypti* **and** *Aëdes notoscriptus* **in a "Desiccated" Condition in a State of Nature.**—*Health*, ii, no. 2, pp. 51–52. Melbourne, March 1924.

Mosquito eggs collected from the water-holding cavity of a *Poinciana* tree near Townsville hatched the day after they were placed in water. Some of the larvae reached the final instar 5 days later and were identified as those of *Aëdes argenteus* (*aegypti*) and *A. notoscriptus*. The eggs had been taken from what would have been the water's edge of the cavity had the latter been full of water, though, in fact, at the time it was only just perceptibly damp. It is assumed that the eggs were laid at a time when it was damp or when it was more or less filled with water—a period dating 12 to 14 weeks previously. In Townsville, therefore, either or both of these species may be expected to appear in numbers a few days after a heavy shower of rain.

Conveyance of *Aëdes aegypti* (*Stegomyia fasciata*) **on Board Ship.**— *Health*, ii, no. 2, p. 52. Melbourne, March 1924.

Aëdes argenteus (*aegypti*) was found on a ship two miles from land near Thursday Island. There was no evidence of mosquito-breeding on the ship, and it is thought probable that the mosquitos had been carried from Calcutta or Balik Papan. The ship had called at these ports respectively 22 and 8 days previously.

Blacklock (B.) & Adler (S.). **A Malaria Parasite of the Chimpanzee.** —*Ann. Trop. Med. & Parasit.*, xviii, no. 1, pp. 1–2. Liverpool, 30th April 1924.

In furtherance of experiments previously described [*R.A.E.*, B, viii, 217; x, 126] the authors have tried to infect a very young chimpanzee that had not previously been attacked with malaria by inoculating human blood heavily infected with *Plasmodium praecox* (*falciparum*). The result was negative, and it is therefore considered to be proved that the parasite occurring in chimpanzees' blood is not *P. praecox*. The name *P. reichenowi* is proposed for it.

Wright (W. R.). **On the Function of the Oesophageal Diverticula in the Adult Female Mosquito.**— *Ann. Trop. Med. & Parasit.*, xviii, no. 1, pp. 77–82. Liverpool, 30th April 1924.

The function of the oesophageal diverticula in mosquitos is discussed, and the author suggests as a provisional hypothesis that the original function is that of a food-reservoir, but that this function is largely suspended in the case of blood-sucking females.

Wright (W. R.). **Notes on some Mosquito Larvae from North Wales.**— *Ann. Trop. Med. & Parasit.*, xviii, no. 1, pp. 83–85, 1 fig. Liverpool, 30th April 1924.

Descriptions and figures are given of the undescribed first instar larva of *Theobaldia* (*Culicella*) *morsitans*, Theo., and notes on the larval instars of *Aëdes* (*Ochlerotatus*) *detritus*, Hal.

Ingram (A.). *Ornithodorus moubata*, **Murray, in relation to Relapsing Fever in the Gold Coast.**— *Ann. Trop. Med. & Parasit.*, xviii, no. 1, pp. 95–97. Liverpool, 30th April 1924.

Ornithodorus moubata, which has been stated not to convey *Spirochaeta recurrentis* [*R.A.E.*, B, xi, 30], appears to be absent from the Gold Coast, and cannot therefore have been concerned in the recent outbreak at Accra [*R.A.E.*, B, xi, 213]. The author has found from various feeding experiments with *O. moubata* obtained from Rhodesia that it is not an efficient carrier of the spirochaetes causing the recent epidemic of recurrent fever in the Gold Coast.

YORKE (W.) & MACFIE (J. W. S.). **The Action of the Salivary Secretion of Mosquitos and of** *Glossina tachinoides* **on human Blood.**— *Ann. Trop. Med. & Parasit.*, xviii, no. 1, pp. 103–108. Liverpool, 30th April 1924.

Further investigations on this subject on the lines of previous experiments [*R.A.E.*, B, iii, 42] have shown that an emulsion of the salivary glands of *Anopheles maculipennis* has a powerful agglutinating action on the erythrocytes of human blood, and, less strongly, on those of the donkey, rabbit and dog, but not on those of the mouse, guinea-pig or monkey (*Cercopithecus*). Emulsions of the stomach and of the ventral oesophageal diverticulum exert no such action. Similar salivary gland emulsions of *Culex pipiens, Theobaldia annulata, Aëdes argenteus* (*Stegomyia fasciata*) and *Glossina tachinoides* do not agglutinate human red cells; nor does the salivary gland emulsion of *A. argenteus* agglutinate the red cells of any of the animals mentioned above, nor exert any anti-coagulating action on human blood; in the case of *Anopheles maculipennis* and of *G. tachinoides* the anti-coagulating action was quite definite. The blood in the stomach of *A. maculipennis*, two hours after feeding on a human being, was found to exhibit complete agglutination of the erythrocytes, but to be unclotted, while that in the stomach of *Aëdes argenteus* under similar conditions exhibited no agglutination but was coagulated. This indicates that the salivary secretion is in part withdrawn into the stomach with the blood when the mosquito feeds; the finding of sporozoites intermingled with the blood in the stomach and ventral oesophageal diverticulum of infected individuals of *A. maculipennis* examined shortly after feeding tends to confirm this. It has also been found that the salivary secretion of *Anopheles bifurcatus* neither causes agglutination of human erythrocytes, nor delays coagulation of human blood; in this respect it differs greatly from that of *A. maculipennis, A. subpictus* (*rossi*) and *A. jamesi*.

YORKE (W.) & MACFIE (J. W. S.). *Trypanosoma evansi* **and** *Ornithodorus crossi*.— *Ann. Trop. Med. & Parasit.*, xviii, no. 1, pp. 125–126. Liverpool, 30th April 1924.

Cross, in recent papers [*R.A.E.*, B, xi, 116, 134] has suggested that *Trypanosoma evansi* causing surra in camels in India is biologically transmitted by the tick, *Ornithodorus crossi*, Brumpt. About 200 examples *O. crossi* obtained from him, after having fed on a dog with numbers of *T. evansi* in its blood, were fed on rabbits and guinea-pigs, but none became infected; this experiment, repeated six months later when changes of temperature were less marked, gave the same results. A number from the first lot were fed on a rabbit in the blood of which were numerous *T. rhodesiense*. Two months later, two of these ticks were dissected and were found to contain blood in which large numbers of motionless trypanosomes were easily recognisable and in a state of remarkable preservation. An injection of the stomach contents of one of these ticks into a mouse failed to produce infection.

CROSS (H. E.) & ABDULLA KHAN. **Surra Transmission Experiments with** *Tabanus albimedius* **and Ticks.**—*Punjab Dept. Agric.*, Vet. Bull. no. 12, 1923, 11 pp. Lahore, 1924.

This is a reprint of a paper previously noticed [*R.A.E.*, B, xi, 116].

(K1736) Wt P.23/D.16 1,500 7/24 H & Sp Gp 52

Garrison (G. L.). **Rearing Records of *Pollenia rudis*, Fab. (Dipt. Muscidae).**—*Ent. News*, xxxv, no. 4, pp. 135–138. Philadelphia, Pa., April 1924.

These experiments were undertaken to obtain additional information on the lines of previous authors, whose work is briefly reviewed. Specimens of *Pollenia rudis*, F., were trapped, and as soon as eggs were found the adults were removed and a known number of earthworms free from parasites were placed on the soil in the cages. The adults emerged in 28–38 days, and in most cases the earthworms were parasitised. Two traps baited with bananas caught 1,425 males and 1,498 females between July and November inclusive.

The Insect Pest Survey Bulletin.—*U.S. Dept. Agric.*, iv, no. 1, 27 pp., multigraph. [Washington, D.C.] 1st April 1924.

Arthropods attacking man or animals during the period November 1923 to April 1924 were *Ixodes ricinus*, L. (castor-bean tick), two individuals being taken from the neck of a man in Oregon, and *Hypoderma lineatum*, Vill. (ox-warble), which, however, was less abundant on cattle than during the past 3 years.

Steevenson (G. F.). **Equine Piroplasmosis, Nuttalliosis or Biliary Fever, as it occurs in India.**—*Vet. Rec.*, iv, no. 15, pp. 315–322, 2 figs. London, 12th April 1924.

The nature of *Nuttallia equi*, the parasite of equine piroplasmosis, the symptoms of the disease, and its general clinical aspects and treatment are described. In India the disease is most prevalent during the hot weather months and the south-west monsoon rains. Imported horses are most susceptible, particularly Australian and English ones; country-bred animals appear to be comparatively immune, though capable of acting as carriers of the disease. The apparent immunity of donkeys and mules is probably accounted for by the fact that they are bred locally. Various biting flies and ticks may act as vectors of the disease, which can be transmitted mechanically. The most common tick on horses in India is *Hyalomma aegyptium*, which usually comes from cattle and does not appear to be connected with the disease. Horses that have been infected and have recovered from the disease undoubtedly act as carriers for a considerable time, possibly all their lives.

Pécaud (G.). **Contribution à l'étude de la Pathologie vétérinaire de la Colonie du Tchad.**—*Bull. Soc. Path. exot.*, xvii., no. 3, pp. 196–207. Paris, 1924.

Very little is known concerning animal diseases in Chad (north-central Africa), and a general account is given of the most important. Various forms of trypanosomiasis occur; *Glossina* is found permanently in the southern parts of the colony and along the big rivers. *G. morsitans* was formerly found much further north, but its limit is now about 12° north latitude. The topographical distribution of *G. morsitans* and *G. tachinoides* is discussed, as well as the diseases transmitted by them, including infections of *Trypanosoma congolense-dimorphon*, frequently a chronic disease in horses, *T. cazalboui*, infecting as many as 40 to 50 per cent. of the cattle in some localities, and

T. pecaudi, common wherever *G. morsitans* occurs, and causing a dangerous and frequently incurable disease of horses, donkeys and dogs. After the rainy season, an epidemic frequently breaks out among the cattle, causing the death of about half the number affected ; this is thought to be a form of piroplasmosis, but the author has never observed a clear case of the disease in cattle, and only once in 10 years has he found a definite infection in the horse, due to *Nuttalia equi*. Mange among camels is common.

The difficulty of applying the necessary measures to prevent these diseases is pointed out. The habits of the natives and their practice of keeping their animals in the towns, without stable or shelter and covered with flies, maintain constant reservoirs of disease, while pigs (which are particularly susceptible to the attacks of tsetse) run loose in the streets. The only method of dealing with epidemics is immediate notification and prompt action, and this necessitates reliable stock-owners and the maintenance of an organisation on the spot, for means of communication are as yet slow.

ROUBAUD (E.) & PÉRARD (C.). **Etudes sur l'Hypoderme ou Varron des boeufs ; les extraits d'oestres et l'immunisation.**—*Bull. Soc. Path. exot.*, xvii, no. 3, pp. 259–272. Paris, 1924.

This is a preliminary study of the toxic action of *Hypoderma* spp. and of the possibility of immunising cattle against it. Filtered extracts of the larvae of *Hypoderma bovis* and *Oestrus* (*Gastrophilus*) *intestinalis* inoculated under the skin of heifers caused no appreciable reaction (at least in animals that had not been naturally infested). On smaller laboratory animals, however, *Oestrus* extracts seemed to have some action. In the course of many experiments which are detailed, it has been noticed that fresh extracts of *Hypoderma* seem to be more active than dry ones. Experiments with heifers have been insufficient to lead to any conclusion regarding the value of these extracts against the action of *Hypoderma*.

Previous investigators have been able to introduce 1st stage larvae into various animals—calves, goats, rabbits, etc. ; positive results have been obtained with cattle and goats. In rabbits, larvae of *Hypoderma* have been found still living more than 2 months after their inoculation under the skin of the back. The present authors have introduced several larvae taken from cattle under the skin of each of two rabbits, one of which was previously given an intravenous injection of extract equal to 2 larvae of *H. bovis*, while the other was given no extract. Both died, the rabbit that had received the injection on the day following the other ; the latter contained one larva still living (out of 6 that had been introduced) on the third day, while the treated one, although it had received 7 larvae, showed no sign of any after death. It would appear, therefore, as though the humoral resistance is strengthened by the injection of the extract, but further tests must be made. If, however, it can be proved that such injections into cattle will strengthen this resistance to the point of delaying the larval development, it may be hoped that the summer cycle of the adult flies can be influenced, at least in temperate climates, to the extent of making their appearance too late to render oviposition effectual. This would be a valuable method of gradually reducing the infestation of cattle, and it is on these lines that further research should be carried out.

FORNARA (L.). **Note sur un cas de localisation sous-arachnoidienne d'une larve de Porocéphale.**— *Ann. Soc. belge Med. trop.*, iii, no. 3, pp. 233–236. Brussels, January 1924.

The author quotes several instances of the finding of larvae of the Linguatulid, *Armillifer* (*Porocephalus*) *armillatus*, Wyman, in the hernial sac exposed in the course of operation. Another case, found during a *post-mortem* in the Belgian Congo, is probably unique in medical records, a larva of *A. armillatus* being found in the convexity of the right occipital lobe of a native boy of 14 who died after a few days' illness, having shown symptoms of meningitis.

VAN DEN BRANDEN (F.). **Contribution à l'étude de la répartition de l'*Ornithodorus moubata* dans le Moyen-Congo.**— *Ann. Soc. belge Med. trop.*, iii, no. 3, p. 303. Brussels, January 1924.

Since the publication of Rodhain's description of the distribution of *Ornithodorus moubata* in the Lower and Middle Congo [*R.A.E.*, B, xi, 199] watch has been kept in the Lufimi territory and the tick has been found in three villages on the Kwango frontier. The interior of this region, and notably the villages on the banks of the Congo, seem as yet to be free from the tick.

SERGENT (Ed.), DONATIEN (A.), PARROT (L.), LESTOQUARD (F.), PLANTUREUX (Ed.) & ROUGEBIEF (H.). **Études expérimentales sur les piroplasmoses bovines d'Algérie.**— *Ann. Inst. Pasteur*, xxxviii, no. 4, pp. 273–343, 42 figs. Paris, April 1924.

A study of the various cattle diseases in Algeria recorded as piroplasmosis show them to be due to 5 distinct parasites, *Piroplasma bigeminum*, *Babesiella berbera*, sp. n., *Gonderia mutans*, *Theileria dispar*, sp. n., and *Anaplasma marginale*. A detailed account is given of these organisms and the particular form of disease each species produces.

The practical conclusions of these observations as regards prophylaxis will be published in a subsequent paper.

MONFRAIS (G.). **Contribution à l'étude de la "Horse Sickness" au Sénégal. Symptomatologie, Etiologie, Traitement.**— *Bull. Comité Etudes hist. & scientif. Afr. occid. fr.*, vi, no. 4, pp. 683–689. Paris, October-December 1923. [Received 22nd April 1924.]

In the course of this paper it is suggested that there are localities of "heart water" as there are of "horse sickness," and the fact that they coincide is a further indication of the possible identity of the virus of the two diseases. The indigenous horses, goats and sheep of these localities would be relatively immune and thus constitute reservoirs of the virus transmissible to imported animals by ticks and biting insects, including probably *Lyperosia* in the case of the horse.

CARPANO (M.). **Su di un tripanosoma tipo "Theileri" osservato nei bovini della Campagna Romana.** [On a Trypanosome of the *theileri* Type observed in Cattle in the Roman Campagna.]— *Ann. d' Igiene*, xxxiv, no. 3, pp. 169–176, 1 pl. Rome, March 1924.

Cattle in the Roman Campagna harbour a trypanosome morphologically and biologically of the type of *Trypanosoma theileri*. Tabanid and Hippoboscid flies are common and are probable vectors of it.

Rat Fleas.—*Kenya : Ann. Rept. Bact. Lab. 1922*, xiii, pp. 190–192, 1 chart. [London, 1924.]

A systematic collection of rat fleas in Nairobi shows a minimum occurrence for April and November, which were wet months, and a maximum occurrence for January and June, which were dry. Of 3,105 fleas taken from a total of 1,146 rats, 1,862 were *Xenopsylla cheopis* and 974 *X. brasiliensis*.

VITÓN (A.). **La Garrapata y la Tristeza.** [Ticks and Piroplasmosis.]—53 pp., 17 figs. Buenos Aires, 1922. [Received 3rd May 1924.]

This paper gives an account of piroplasmosis of cattle, its vector, *Boophilus annulatus* var. *microplus*, Can., and the measures taken against it in Argentina.

PETTIT (R. H.). **Report on the Section of Entomology.**—*61st Ann. Rept. Michigan State Bd. Agric., 1921–22*, pp. 211–214. East Lansing, Mich., 1923. [Received 2nd May 1924.]

The occurrence is recorded of several individuals of *Xenopsylla* (*Pulex*) *brasiliensis* on rats in Michigan. This flea has hitherto been found only as a rarity in Brazil, and is important as a possible carrier of disease.

HIRST (S.). **On a New Mite of the Genus *Chorioptes* parasitic on goats in the United States.**—*Ann. Mag. Nat. Hist.*, xiii, no. 77, p. 538. London, 1924.

Chorioptes texanus, sp. n., infesting goats is described from Texas.

WENDLER (A.). **Die Bedeutung und Bekämpfung der Pferderäude vor dem Kriege, während und nach dem Kriege.** [The Importance and Control of Horse Mange before, during, and after the War.]—*Deutsche tierärztl. Wochenschr.*, xxxii, no. 18, pp. 254–265. Hanover, 3rd May 1924.

After the war, horse mange decreased in importance, and for economic reasons treatment with sulphurous anhydride (SO_2) has gradually yielded place to the older and less efficient method of using ointments and liniments.

MARTINI (E.). **Was ist *Phlebotomus* el Ghor H. v. Schroetter ?**—*Arch. Schiffs- u. Trop.-Hyg.*, xxviii, no. 4, p. 168. Leipzig, April 1924.

The insect described by von Schroetter as *Phlebotomus* el Ghor [*R.A.E.*, B, xii, 63] is apparently a *Psychoda*.

GLASER (R. W.). **The Effect of Food on Longevity and Reproduction in Flies.**—*Jl. Exptl. Zool.*, xxxviii, no. 3, pp. 383–412, 6 tables. Philadelphia, Pa., November 1923.

These experiments on flies were made continuously from May to November 1922, the author having noticed in previous ones [*R. A.E.*, B, xii, 64] that a close correlation existed between various types of food on the one hand and longevity and reproduction on the other. The flies used were *Musca domestica*, *Stomoxys calcitrans* and *Lyperosia*

irritans. The conclusions arrived at with *M. domestica* are that sugar or some form of starch that can be eaten and assimilated is an important factor in the longevity of adult house-flies. Also, sugar or assimilable starch, together with a solution of proteins or products of protein hydrolysis, like bouillon or blood serum, are necessary oviposition factors. Types of food while important for the production of eggs are not alone responsible for the degree of oviposition, *i.e.*, for the number of depositions and total number of eggs. Defibrinated cow or horse blood is an appropriate food for adult *Stomoxys*. On this food many fertile eggs, which will develop and produce another generation of flies, may be obtained. The serum is probably the most important factor as regards longevity, but both the cellular elements and the serum are essential for the production of eggs. The food is not alone responsible for the degree of oviposition. With both *M. domestica* and *Stomoxys calcitrans* the males exert an important stimulus on the females, the nature of which is unknown. The first generation of *Lyperosia irritans* can be kept alive artificially long enough to develop ovaries and testes, but they lay no eggs, so that a second generation could not be reared. It is difficult to say whether the food or the treatment or both are responsible. The reproductive organs of both sexes are affected, and there is also an effect on the nervous system, for sexual excitation and pairing have never been observed among any adults that the author has reared.

It is concluded that flies are dependent upon certain types of food which are closely correlated with longevity and reproduction, but the foods given were not the only things that found their way into the intestines, and the part played by various intestinal bacteria was not touched on in this study. No account has been taken of variations in temperature and humidity, and such variations may have a profound effect upon *Lyperosia*.

KRÖBER (O.). **Beiträge zur Kenntnis paläarktischer Tabaniden. I & II.** [Contribution to the Knowledge of Palaearctic Tabanidae.]—*Arch. Naturgesch.*, Abt. A, lxxxviii, no. 8, pp. 114–164; lxxxix, no. 12, pp. 55–118. Leipzig, August 1922 & March 1924.

Keys to the species of *Surcoufia*, gen. n., *Heptatoma*, *Haematopota*, *Silvius* and *Tabanus* (*Therioplectes*) are given, with particulars of their geographical distribution.

The new species are *Silvius fasciatus*, *S. coquilletti* and *S. fascipennis* from Japan; *Heterochrysops pallidiventris*, *Surcoufia paradoxa*, *Haematopota algira* and *H. desertícola* from North Africa; *H. caenofrons* and *H. caucasica* from the Caucasus; *H. flavopilosa* from South Russia; *H. planicornis* from Spain; *H. pallidula* from Austria; *H. sobrina* from Asia Minor; *H. ornata* from Formosa; *H. turkestanica* and *Tabanus nigricorpus* from Turkestan; and *T. longipalpis* from Sicily. Several new varieties are also described.

HATORI (J.). *Anopheles* **Distribution in Formosa.**—*Taiwan Igakkwai Zasshi* [Jl. Formosan Med. Soc.], no. 231. November 1923. (Abstract in *Japan Med. World*, iv, no. 3, pp. 74–75. Tokyo, 15th March 1924.)

All the species of Anophelines hitherto known in Formosa have spotted wings, but a female of what appears to be *Anopheles* (*Stethomyia*) *aitkeni*, James, has recently been taken in the north of the island.

Cooley (R. A.). **19th Report of the State Entomologist of Montana.**— *Montana Agric. Expt. Sta.*, Bull. 150, p. 29. Bozeman, Mta., December 1922. [Received 12th May 1924.]

A case is recorded of two partly-grown larvae of *Hypoderma* sp. (warble fly) being found under the skin of a child 5 years old.

Sullivan (K. C.). **The Use of Calcium Cyanide for the Control of Fleas and other Insects.**— *Jl. Econ. Ent.*, xvii, no. 2, pp. 230–237. Geneva, N.Y., April 1924.

Recent tests with calcium cyanide indicate the possibilities of this material in the control of insect pests, such as the fleas, *Ctenocephalus canis*, Curt., and *Pulex irritans*, L. In closed buildings 4 oz. to 100 cu. ft. destroyed all the fleas, though in open buildings twice this quantity is required; but further experiments are needed before definite conclusions are drawn.

DeOng (E. R.). **Toxicity of Sodium Fluoride to Man.**— *Jl. Econ. Ent.*, xvii, no. 2, pp. 343–344. Geneva, N.Y., April 1924.

In view of the increasing use of sodium fluoride for the control of pests such as cockroaches and ants, attention is drawn to the toxic properties of this substance. Small doses such as 0·06 of a gram for a 160-pound man are toxic and should not be present in the food of man and animals. Various instances of accidental poisoning with this substance are reviewed.

Catanei (A.). **Essai critique sur la morphologie des parasites du paludisme.**— *Arch. Inst. Pasteur d'Algérie*, i, no. 1, pp. 10–108, 3 pls. Algiers, 1923. [Received 16th May 1924.]

During the last 20 years a study of the morphology of the parasites of malaria has given rise to a number of contradictory statements. The author has therefore made an exhaustive study of the question, based largely on observation of a case of a malarial subject infected simultaneously with *Plasmodium praecox*, *P. vivax* and *P. malariae*, together with a number of other parasites that appeared to be unusual.

The conclusions reached are that the varieties of *Plasmodium* described by different authors as distinct from the three classical types do not constitute valid species or sub-species, but are only transitory morphological adaptations of the typical forms.

Sergent (Et.) & Gueidon (E.). **Chronique du bouton d'Orient en Algérie. Le "Clou de Mila."**— *Arch. Inst. Pasteur d'Algérie*, i, no. 1, pp. 1–3. Algiers, 1923. [Received 10th May 1924.]

A form of leishmaniasis, allied to oriental sore, which was common enough some 40 years ago, when colonisation began, has gradually become very rare. The authors, however, have been unable to find any reason for the decrease in the number of cases, nor for the diminution in the possible breeding-places of *Phlebotomus*. *P. papatasii* is present in Mila.

Sergent (Et. & Ed.) & Catanei (A.). **Etude expérimentale du paludisme des oiseaux** (*Plasmodium relictum*).— *Arch. Inst. Pasteur d' Algérie*, i, no. 3, pp. 264–278, 1 graph. Algiers, September 1923. [Received 16th May 1924.]

An account is given of experiments to test the value of drugs other than quinine as a preventive or cure of malaria in birds. The effect of chlorhydrate of cinchonidine on *Plasmodium relictum* is less than that of quinine, but it has a marked action on enlargement of the spleen.

Parrot (L.). **La faune anophélienne de l'Algérie du Nord.**— *Arch. Inst. Pasteur d' Algérie*, i, no. 3, pp. 291–294. Algiers, September 1923. [Received 16th May 1924.]

This is a summary of previously published information on the Anopheline mosquitos recorded from Northern Algeria. The species concerned are *Anopheles maculipennis*, Meig., *A. algeriensis*, Theo. (which is here treated as a variety of *A. bifurcatus*, L.), *A. hispaniola*, Theo., and *A. multicolor*, Camb., and a key to them is given.

Foley (H.). **Les moustiques du Sahara algérien.**— *Arch. Inst. Pasteur d' Algérie*, i, no. 3, pp. 295–301. Algiers, September 1923. [Received 16th May 1924.]

The predominant Anopheline in the Sahara is *Anopheles multicolor*, Camb., which breeds in the very salt stagnant water of the desert, adults being found 13 days after oviposition. Although, to the author's knowledge, no record has yet been made of the presence of malarial zygotes or sporozoites in the stomach and salivary glands of this species, its almost exclusive occurrence in all the endemic centres of malaria in the oasis indicate that it is the vector of the disease in the Sahara. Other mosquitos occurring in small numbers are *A. hispaniola* Theo., *A. sergenti*, Theo., and *A. maculipennis*, Meig. (only found in the Sahara in the Biskra region).

Culicines are found in every collection of stagnant water, and it is noticeable that as the gradual concentration of salt in the water and shallower breeding-places are produced in the heat of summer, the Culicine fauna is gradually replaced by larvae of *A. multicolor*. In an oasis, where only wells occur, they are frequently found to be breeding-places of Culicines. The species observed include *Culex pipiens*, L.; *C. apicalis*, Adams; *C. laticinctus*, Edw.; *Theobaldia longiareolata*, Macq. (*spathipalpis*, Rond.), the larvae of which are carnivorous and frequently attack all other species living in the same habitat; and *Aëdes* (*Ochlerotatus*) *caspius*, Pall. (*Grabhamia subtilis*, Serg.), a very small species that can pass through ordinary mosquito-netting. *Aëdes argenteus*, Poir. (*Stegomyia fasciata*, F.) has also recently been recorded at an oasis about 300 miles south of Algiers, though it has usually been considered to be confined to the coast and rivers.

Sergent (Ed. & Et.) & Parrot (L.). **Les moustiques de Bône.**— *Arch. Inst. Pasteur d' Algérie*, i, no. 3, pp. 302–306, 1 plan. Algiers, September 1923. [Received 16th May 1924.]

An inspection of the Bône district in 1922 led to the conclusion that the mosquitos infesting the town came from the sewers. Various

methods of dealing with the problem are discussed ; the best seems to be prevention of access of the adult mosquitos to the sewers by means of siphon pipes placed at all outlets.

Etude épidémiologique du paludisme en Algérie en 1922–23.— *Arch. Inst. Pasteur d' Algérie*, i, no. 3, pp. 308–511, 143 figs.

PARROT (L.). **Observations et considérations générales.**— *Ibid.*, pp. 498–511. Algiers, September 1923. [Received 16th May 1924.]

The results of an investigation into the reservoir of the virus of malaria, conducted during 1922–1923, lead to the conclusion that one in three of the native children shows enlarged spleen in the spring in northern Algeria, while one in ten harbours the malaria parasite in the blood. The breeding-places of Anophelines are illustrated on a map and charts. They show the great variety of breeding-places, both natural and artificial, and both permanent and temporary. Clear fresh, stagnant or slowly moving water, harbouring or shaded by dense vegetation, is preferred by the larvae of *A. maculipennis* and *A. algeriensis*, while *A. hispaniola* and *A. sergenti* require open ponds practically free from vegetation.

Etude épidémiologique du paludisme dans les Territoires du Sud.— *Arch. Inst. Pasteur d' Algérie*, i, no. 3, pp. 512–545, 4 pls, 5 plans. Algiers, September 1923. [Received 16th May 1924.]

This consists of a number of reports on local malarial conditions from the southern territories of Algeria.

BALLET (B.). **Etude épidémiologique du paludisme dans le 19e Corps d'Armée en 1920.**— *Arch. Inst. Pasteur d' Algérie*, i, no. 3, pp. 545–562. Algiers, September 1923. [Received 16th May 1924.]

This is a series of reports from the various districts where troops were stationed in 1920 with suggestions for the control of malaria.

VIALATTE (C.). **La lutte antipaludique au Maroc. (Etat de la question et résumé de la campagne de 1922.)**— *Arch. Inst. Pasteur d' Algérie*, i, no. 3, pp. 563–583, 3 pls., 2 plans. Algiers, September 1923. [Received 16th May 1924.]

A study of malaria in Morocco, where the campaigns against the disease have been more methodically organised during recent years, has shown that treatment of the whole problem *en bloc* is impossible. The administration of the Protectorate has already, however, adopted certain necessary measures, and the regulations for anti-malarial organisation at present lacking are about to be enforced.

SERGENT (Et.) & TRIOLLET (R.). **Chronique du Bouton d'Orient en Algérie. Septième cas constaté hors des régions sahariennes.**— *Arch. Inst. Pasteur d' Algérie*, i, no. 4, p. 612. Algiers, December 1923. [Received 16th May 1924.]

A case is recorded of the occurrence of oriental sore, from the lesions of which *Leishmania* was recovered, in a person who had never left the high country between Setif and Constantine. Several individuals

of *Phlebotomus* captured in this region have been identified as *P. perniciosus*.

EDWARDS (F. W.). **On some Algerian Species of** *Simulium*.— *Arch. Inst. Pasteur d' Algérie*, i, no. 4, p. 647–653, 2 figs. Algiers, December 1923. [Received 16th May 1924.]

A collection of Simuliids taken in the neighbourhood of Biskra and Algiers has shown that these insects are much more widely distributed than is generally supposed. The species dealt with include *Simulium ornatum*, Mg., *S. ornatum* var. *nitidifrons*, Edw., *S. bezzii*, Corti, *S. aureum*, Fries (*angustipes*, Edw.), *S. beckeri*, Roub., *S. equinum*, L., and *S. sergenti*, sp. n.

The classification of Simuliids in general is briefly discussed.

KIEFFER (J. J.). **Ceratopogonines recueillis au Sahara constantinois.**— *Arch. Inst. Pasteur d' Algérie*, i, no. 4, pp. 654–683, 27 figs. Algiers, December 1923. [Received 16th May 1924.]

The biting midges dealt with in this paper, collected from oases of the Constantine Sahara, include *Holoconops mediterraneus*, Kieff., found abundantly in April and May, both in the interior of the town and among the surrounding palms, the male being described for the first time ; *Microconops* (?) *longipalpis*, sp. n., and *M.* (?) *rufiventris*, sp. n., of which the males are described from Biskra ; and *Tersesthes camelorum*, Kieff., of which the characters of the female are given.

Keys are given to the species of *Forcipomyia*, *Dasyhelea* and *Culicoides*, and those dealt with include *Forcipomyia armaticrus*, sp. n., *F. cataneii*, sp. n., *F. sahariensis*, sp. n., *F. sulfurea*, sp. n., and *F. seneveti*, Kieff. ; *Dasyhelea bihamata*, sp. n., *D. bicrenata*, sp. n., and *D. bifurcata*, sp. n., of which the males are described from Biskra, *D. parcepilosa*, sp. n., and *D. monilicornis*, sp. n., of which the females are described from, or near, Biskra, and *D. begueti*, Kieff. ♂ (*astyla*, Kieff. ♀) var. *biskraensis*, n., of which the female is described ; *Culicoides citrinellus*, sp. n., of which both sexes are described, taken at Biskra on camels in April and May, *C. saevus*, Kieff., of which the male is described from Biskra, females having been taken on camels, *C. parroti*, Kieff., of which the male is described and which is abundant at Biskra and other localities from the beginning of May, the female biting man and animals, *C. sahariensis*, sp. n., of which the female is described, taken at Biskra on donkeys and camels, and *C. donatieni*, Kieff., of which the male and nymph are described from Biskra, the female being taken on camels.

FOLEY (H.) & PICOUT-LAFOREST (A.). **Quelques observations sur la Répartition et la biologie d'** *Holoconops mediterraneus* **(Ceratopogoninés) dans les régions sahariennes.**— *Arch. Inst. Pasteur d' Algérie*, i, no. 4, pp. 684–687. Algiers, December 1923. [Received 16th May 1924.]

Holoconops mediterraneus is of wide distribution and occurs in Algeria, extending far into the Sahara. Near Biskra it has been observed biting sheep, goats and donkeys, and in Morocco it is a common blood-sucker of mules. An examination of 50 individuals

captured on 10 donkeys showed microfilariae in two of them taken from different animals, one of which revealed the presence of the same organism in the blood. Its development in the insects has not, however, been studied.

VIALATTE (C.). **Contribution à la récherche de l'aire de dispersion de *Stegomyia fasciata*. Son existence à Marrakech.**—*Arch. Inst. Pasteur d' Algérie*, i, no. 4 pp. 688–690. Algiers, December 1923. [Received 16th May 1924.]

Aëdes argenteus, Poir. (*Stegomyia fasciata*) occurs commonly all along the Moroccan coast. It has, however, been unexpectedly found at Marrakesh, which is separated from the coast district by a sub-desert region of an average width of about 312 miles. It is supposed that motor traffic has been the cause of its introduction into the town, where the numerous house receptacles for water, etc., would furnish breeding-places for the larvae.

DONATIEN (A.) & ARNAUD (J.). **Traitement de la gale du dromadaire à l'Institut Pasteur d'Algérie (4e note).**—*Arch. Inst. Pasteur d' Algérie*, i, no. 4 pp. 691–692. Algiers, December 1923. [Received 16th May 1924.]

Many methods of treating mange in camels on the Algerian coast, where the damp climate is very favourable to the disease, have been tried [*R. A. E.*, B, viii, 185]. The best as yet known consists of an ointment made of 5 lb. melted mutton fat, to which is added $1\frac{1}{5}$ gal. of poppy oil and 4 lb. sublimated sulphur. This is thoroughly mixed and stirred constantly until cold, $6\frac{1}{2}$ lb. of the ointment being required to treat one large camel. The animal must first be completely shaved and thoroughly brushed with a couch-grass brush to remove all scabs, after which the ointment is well rubbed into the skin all over the animal. When this treatment was given every two months during the winter (November to March), the animals went through the warm season without a return of the disease.

CHRISTOPHERS (S. R.). **Preliminary Investigation into the Conditions on the Bengal Iron Company's Mines at Manharpur, January 1923.**—*Enquiry on Malaria, Blackwater Fever and Anchylostomiasis in Singhbhum*, Rept. no. 1, 37 pp., 4 figs., 6 maps. Patna, 1923. [Received 19th May 1924.]

The Anophelines found in the course of this investigation were *Anopheles culicifacies*, Giles; *A. listoni*, List.; *A. minimus*, Theo.; *A. jeyporiensis*, James; *A. subpictus*, Grassi (*rossi*, Giles); *A. vagus* Dön.; *A. willmori*, James; *A. theobaldi*, Giles; *A. maculipalpis*, Giles; *A. pallidus*, Theo. (*fowleri*, Christ.); *A. tessellatus*, Theo.; *A. aitkeni*, James; *A. barbirostris*, Wulp; and *A. hyrcanus*, Pallas (*sinensis*, Wied.).

The observations indicate that *A. listoni* and *A. culicifacies* are the important carriers of malaria. *A. willmori* is considered a potential danger, because, although not found in houses during the present survey, it is known to frequent them and is a carrier both experimentally and in nature. Its absence in the present instance may have been merely seasonal. Various suggestions are made for the treatment of

breeding-places, subsoil drainage being recommended for the stream beds in much the same manner as has been employed in the Federated Malay States and for the drying of rice fields. The usual accessory measures, such as screening of bungalows, quinine prophylaxis, and personal protective measures, are discussed.

Destruction of Blow-fly Maggots : An Experiment.— *Jl. Dept. Agric. Union S. Africa*, viii, no. 4, p. 416. Pretoria, April 1924.

A very large number of blow-flies breed in carcasses that are left on the veld without being properly disposed of. The species chiefly concerned are *Chrysomyia albiceps* and *C. marginalis*. In recent experiments a surprisingly small number of adults of these species were obtained from a carcass heavily infested with maggots. Apparently about 60 per cent. of the fly pupae had been destroyed by a Chalcid parasite, probably *Mesocomys pulchriceps*. Though very little is known about this parasite, it is evidently of considerable value in reducing the numbers of one of the worst sheep pests.

Headlee (T. J.) & Walden (W. M.). **Report of Mosquito Work.**— *Ann. Rept. New Jersey Agric. Expt. Sta. 1921–22*, pp. 475–486. New Brunswick, N.J., 1923. [Received 21st May 1924.]

The investigations carried out in 1921 to determine the attraction of man for mosquitos are described [*R. A. E.*, B, x, 190], and particulars of the drainage of salt marshes are given. The mosquitos recorded during the year included *Aëdes vexans* (*sylvestris*), *A. sollicitans*, *A. stimulans*, *A. cantator* and *A. taeniorhynchus*.

Barraud (P. J.). **A Revision of the Culicine Mosquitoes of India. Parts IX-XIII.**— *Ind. Jl. Med. Res.*, xi, no. 4, pp. 971–976, 977–978, 979–998, 1259–1274 & 1275–1282, 11 pls. Calcutta, April 1924.

This is a continuation of previous papers [*R. A. E.*, B, xii, 62]. The first two papers deal with the larvae and adults of the genus *Lutzia*, and a key to the Indian species is given. The last three deal with some Indian species of *Culex*, the following being described as new: *C. hutchinsoni*, *C. fuscitarsis*, *C. tenuipalpis*, *C. iphis* and *C. pluvialis*.

Barraud (P. J.). **Four new Mosquitoes from the Western Himalayas.** —*Ind. Jl. Med. Res.*, xi, no. 4, pp. 999–1006, 1 fig. Calcutta, April 1924.

The new species described from the Western Himalayas are *Megarhinus edwardsi*, *Aëdes* (*Finlaya*) *gilli*, *A.* (*F.*) *albocinctus*, and *Culex eadithae*. The larvae of the first three were bred from tree-holes.

Sinton (J. A.). **Notes on some Indian Species of the Genus** *Phlebotomus*. **Parts V-VIII.**— *Ind. Jl. Med. Res.*, xi, no. 4, pp. 1007–1049, 2 pls. Calcutta, April 1924.

The first three papers, which are a continuation of some previously noticed [*R. A. E.*, B, xii, 62], deal with the morphology of *Phlebotomus malabaricus*, Annan., *P. perturbans*, de Meij., and *P. zeylanicus*, Annan., the details of diagnostic importance being given.

The last paper records the geographical distribution and the seasonal prevalence of the known Indian and Cingalese species of this genus. It is very important that a more exact knowledge should be obtained and that in experiments on disease transmission the name of the species should be accurately ascertained. An extensive bibliography is appended.

McCarthy (T.). **Mosquitoes as a Cattle Pest.**—*Agric. Gaz. N.S.W.* xxxv, pt. 4, p. 290. Sydney, 1st April 1924.

A 3 per cent. emulsion of pine tar creosote has been found effective as a repellent for mosquitos attacking cattle. It is made by mixing thoroughly 3 gals. pine tar creosote with 3 gals. water in which 1 lb. caustic soda (98 per cent.) has been dissolved, the total being made up to 100 gals. with cold water. It is applied to the cattle as a spray.

Johnson (C. W.). **Diptera of the Williams Galapagos Expedition.**—*Zoologica*, v, no. 8, pp. 85–92, 2 figs. New York, 1924.

Among the flies dealt with from the Galapagos Islands the following are recorded: *Ceratopogon galapagensis*, Coq., *Aëdes taeniorhynchus portoricensis*, Ludl., *Tabanus vittiger*, Thoms., *Cochliomyia macellaria*, F., and the Hippoboscids, *Olfersia spinifera*, Leach, *O. fossulata*, Macq., *Ornithoponus americanus*, Leach, and *O. intertropicus*, Wlk.

Banks (N.). **Arachnida of the Williams Galapagos Expedition.**—*Zoologica*, v, no. 9, pp. 93–99, 4 figs. New York, 1924.

The following ticks are recorded from the Galapagos Islands: *Amblyomma williamsi*, sp. n., and *A. darwini*, Hirst, from lizards, and *Ornithodorus talaje*, Guér.

Séguy (E.). **Les Moustiques de l'Afrique Mineure, de l'Egypte et de la Syrie.**—8vo, 257 pp., 29 pls., 106 figs., 10 maps. Paris, Paul Lechevalier, 1924. Price Fr. 50.

This work forms volume i of the *Encylopédie Entomologique* and contains a preface by E. L. Bouvier. It is a valuable contribution to the knowledge of the mosquitos of Mediterranean Africa and includes a comparative study of these species and of those occurring in central and northern Europe. Their identification is greatly facilitated by numerous tables and illustrations, and extensive data concerning the larvae and oviposition have been most carefully collected.

A catalogue of the Culicidae of the Nearctic and Palaearctic regions is appended.

Edwards (F. W.). **A Synopsis of the Adult Mosquitos of the Australasian Region.**—*Bull. Ent. Res.*, xiv, pt. 4, pp. 351–401. London, May 1924.

All mosquitos endemic to the region are discussed, including those that have been found on the mainland of Australia or Papua. In addition to these a number of other Oriental species have been recorded from the Moluccas, Celebes and the Timor group, but not from further east. Of these only a list is given.

Of the 145 species dealt with, 67 belong to the genus *Aëdes* in the broad sense ; about 25 occur in the Oriental region, the total number of known species peculiar to the Australian region being about 120. The Pacific islands on the whole have a very poor mosquito fauna as regards the number of species. The only suggestion of any affinity between the Australasian and Neotropical faunas seems to be in the presence in both areas of the species of *Ochlerotatus* of the *taeniorhynchus* group. The genera *Bironella* and *Opifex* are peculiar to this region, but many of the genera occurring in the Oriental region are apparently absent, whilst some other genera and subgenera, particularly *Anopheles* and *Stegomyia*, are comparatively poor in species.

In the present revision the same characters are used for the classification of the genera as in the author's previous work [*R. A. E.*, B, x, 17].

Keys are given to the genera of the Culicines ; the Australasian species of *Rachionotomyia* ; to the males and females of the subgenera of *Aëdes* ; and to the species of *Culex*.

The new species described are : *Rachionotomyia magnesiana* from Queensland ; *R. solomonis* from Solomon Is. ; *Taeniorhynchus* (*Coquillettidia*) *tenuipalpis* from New Zealand ; *Aëdes* (*Banksinella*) *brugi* from Papua ; *A.* (*Ochlerotatus*) *cunabulanus* from Tasmania ; *A.* (*Finlaya*) *palmarum* from N. Queensland ; *A.* (*Aëdes*) *carmenti* from Solomon Is. ; *A.* (*Skusea*) *fimbripes* from New Britain ; and *A.* (*S.*) *tonus* from Amboina. *Taeniorhynchus* (*Coquillettidia*) *xanthogaster*, n. n., is proposed for *T. acer*, Theo., nec Wlk., and *Rachionotomyia cephasi*, Edw. [*R. A. E.*, B, xi, 153] now proves to be a synonym of *R. tasmaniensis*, Strick. The paper also contains much new synonymy of the less known species from this region.

KLIGLER (I. J.). **Notes on the Hibernation of** *Anopheles* **Mosquitos in Palestine.**—*Bull. Ent. Res.*, xiv, pt. 4, pp. 403–407. London, May 1924.

The following is part of the author's summary : The various stages of the common malaria-transmitting Anophelines in Palestine are able to survive part or all of the winter months. Eggs of *Anopheles superpictus* were in the laboratory 3½ weeks before they hatched ; at a mean temperature of 17° C. [62·6° F.] the larval stage lasted 20 and the pupal stage 5 days. Larvae of *A. bifurcatus* remained 2 to 3 months under winter conditions. Adults of *A. elutus*, *A. superpictus* and *A. bifurcatus*, were found during January, February and March, when it was certain that there was little or no breeding.

Hibernation in the true sense of the word does not occur in Palestine, because the temperature is not uniformly below the level at which activity ceases. Larvae were noted to cease activity at temperatures below 12° C. [53·6° F.] and become active again as soon as the temperature rose to 14° C. [57·2° F.] or over. At low temperatures the larvae lie supine at the bottom of a pool and only appear on the surface when the temperature of the water rises, and this is apparently one of the reasons why they seem to disappear completely during the winter months. This fact was observed in the field late in March and early in April, when no larvae were visible after careful search in the morning, but could be found readily in the afternoon, when the temperature of the water had risen to 18° C. [64·4° F.] or over.

Adult mosquitos also show this intermittent activity depending on the temperature. At over 16° C. [60·8° F.] they fed without difficulty,

and at 17° C. [62·6° F.] they deposited eggs. The large number of adult mosquitos found with partly digested blood is clear proof that they feed also under natural conditions; while the eggs brought in with the algae indicate that oviposition also occurs. This intermittent activity accounts also for the sporadic cases of new infections that appear throughout the winter months.

By way of conclusion it may be said that malaria-transmitting Anophelines may pass the winter season in all stages, but hibernation is only partial. For all practical purposes, however, there is a period of complete quiescence from the middle of December to the middle or end of March, when mosquito control may be discontinued.

MacGregor (M. E.). *Aëdes* (*Stegomyia*) *mascarensis*, **MacGregor: A New Mosquito from Mauritius.**—*Bull. Ent. Res.*, xiv, pt. 4, pp. 409–412, 1 fig. London, May 1924.

Both sexes of *Aëdes mascarensis*, sp. n., are described from Mauritius, and keys are given to the adults and larvae of the Mauritian species of the subgenus *Stegomyia*.

MacGregor (M. E.). **A Note on the Fertilisation of** *Anopheles*.—*Bull. Ent. Res.*, xiv, pt. 4, p. 413. London, May 1924.

Though attempts to induce fertilisation in captive examples of *Anopheles maculipennis* and *A. bifurcatus* even under most favourable conditions proved unsuccessful in Great Britain, it was easily obtained under laboratory conditions in Mauritius with the following species: *A. mauritianus*, *A. maculipalpis*, *A. costalis*, and *A. funestus*. It is remarkable that in the more northern latitudes of Britain a nuptial flight at high altitudes should be necessary for fertilisation, and it appears possible that some slight, but important, factor has been missed which may account for the failure to induce fertilisation of British Anophelines in the laboratory.

Austen (E. E.). **Additional Records of Palestine Tabanidae, with Descriptions of New Species.**—*Bull. Ent. Res.*, xiv, pt. 4, pp. 421–432, 4 figs. London, May 1924.

These additional records of Palestine Tabanids [*R. A. E.*, B, x, 208] include descriptions of *Chrysops compacta*, sp. n., and *Tabanus cuspidatus*, sp. n., and of the hitherto unknown male of *Tabanus pallidipes*, Aust.

Brug (S. L.). **Notes on Dutch-East-Indian Mosquitos.**—*Bull. Ent. Res.*, xiv, pt. 4, pp. 433–442, 8 figs. London, May 1924.

The species dealt with include *Aëdes* (*Skusea*) *umbrosus*, sp. n., from S.E. Borneo and Java, and *Uranotaenia papua*, sp. n., from New Guinea. The hitherto unknown larvae of the following species are also described: *A.* (*Stegomyia*) *albolineatus*, Theo., *A.* (*Aëdimorphus*) *caecus*, Theo., *A.* (*Ochlerotatus*) *vigilax*, Skuse, *Armigeres jugraensis*, Leic., *A. obturbans*, Walk., *Culex brevipalpis*, Giles, and *Uranotaenia atra*, Theo.

TONNOIR (A. L.). **A New biting Ceratopogonid from New Zealand.**—*Bull. Ent. Res.*, xiv, pt. 4, pp. 443–444, 1 fig. London, May 1924.

Acanthoconops myersi, sp. n., is recorded as attacking man.

CURSON (H. H.). **Notes on *Glossina pallidipes* in Zululand.**—*Bull. Ent. Res.*, xiv, pt. 4, pp. 445–453, 4 pls. London, May 1924.

The type of country frequented by *Glossina pallidipes* and known in South Africa as " bush-veld " occurs in Zululand from a few feet above sea-level to approximately 1,500 ft. The general character of the vegetation is described. Gravid females may be caught throughout the year but are most abundant from October to March. The seasonal and meteorological influences on the activities of the fly, its method of attack, and host selection are discussed. Rough hairy-coated animals are less attractive, and distinct preference is shown for dark over light animals. Zebra and warthog appear to be the common hosts in certain localities, whilst in others wildebeest and inyala appear to be the chief source of blood, probably depending on the abundance of the respective animals. There is reason to believe that baboons and vultures (when on the ground) are attacked by *Glossina*.

Judging from the evidence of outbreaks of nagana and from the observations made in connection with tethering experiments, it would appear that the flies prefer the sheltered wooded valleys to the more open slopes. Though they may be carried for a considerable distance on the host, there is a tendency to return unless shade conditions are suitable. It seems reasonable to assume that exposure to a low temperature during the dry season is one of Nature's methods of controlling *Glossina*.

As these observations suggest that tsetse-flies relatively seldom if ever follow domesticated animals into the open country, the outbreaks of trypanosomiasis occurring amongst cattle grazing in such country can probably be traced to the common practice of allowing the animals to drink in the wooded valleys. If fencing were more generally adopted and other arrangements made for the watering of animals, such as bore-holes, there would be fewer outbreaks of the disease.

European settlement within a fly area does not necessarily mean speedy banishment of the fly ; at any rate in Zululand it would seem that although large game on the settlement itself may be decimated, *Glossina* may continue to exist so long as domesticated stock are kept not only on the confines of fly areas but actually in the areas themselves. The tendency of European agriculture is to cultivate large tracts of open ground, leaving the overgrown banks of streams untouched and therefore more suitable for tsetse than under native conditions, where most of the cultivation is along these stream banks. Owing to the habits of the flies, they are not greatly affected by grass fires, especially as most of these occur in June to August, when the flies have retired to their winter haunts. Details are given of a wasp, *Bembex olivata*, and several birds that are predacious on *G. pallidipes*.

It is generally believed by the natives that the fly is encroaching southwards and this belief would seem to be supported by topographical evidence.

Stockholm tar was found to be an effective repellent if rubbed all over an animal at least twice daily with a cloth saturated with it, though this is only practicable in the case of a small number of animals.

[Shestakov (A).] **Шестаков (А.).** [Report on Entomology.]—**Отчет малярийной станции Ярославского губ. отд. Здравоохранения за 1923 г.** [*Rept. Malaria Sta. Yaroslav Govt. Dept. Health Preservation 1923.*]—pp. 7–17. Yaroslav, 1923. [Received 12th May 1924.]

As the result of an attempt to investigate the breeding places of Anophelines in the Yaroslav district, the various types of waters are described, the district being particularly suitable as a mosquito breeding ground in view of the marshy nature of the land. *Anopheles maculipennis*, Meig., was practically the only species found, the larvae of *A. bifurcatus*, L., being taken on one occasion only. During the summer of 1923 the first eggs were laid about 15th May, the adults of the first generation occurring about 21st June and those of the second about the beginning of September, but there is considerable overlapping, the larvae being found throughout the summer in various stages of development. Oiling was carried out on a large scale, crude oil being used for the purpose at the rate of about 65 lb. per 100 sq. ft. Various methods of applying the oil were tried, the most satisfactory results being obtained by throwing it over the surface with wooden shovels as it was too thick and heavy for any other method.

[Brodski (A. L.).] **Бродский (А. Л.). К биологии рода** *Anopheles* **(исследования на рисовых посевах).** [On the Biology of the Genus *Anopheles* (Investigations in Rice Fields).]—**Бюллетень 1-го Средне-Азиатского Государств. Университета** [*Bull. 1st C. Asiatic State Univ.*], no. 1, pp. 7–10. Tashkent, November 1923. [Received 22nd May 1924.]

These observations were made in rice fields in the vicinity of Tashkent, the species found being *Anopheles maculipennis* (*claviger*), *A. hyrcanus* (*pseudopictus*) and *A. pulcherrimus*.

A. maculipennis appears in maximum abundance towards the end of June and beginning of July, followed by *A. pulcherrimus* at the end of July and beginning of August. Whilst *A. maculipennis* is more abundant in the native dwellings than in the European habitations where more light and air are admitted, *A. pulcherrimus* apparently only reacts to the presence of warm-blooded animals and man. *A. hyrcanus* was most abundant amongst shrubs and under trees, attacking man and animals that came near.

The larvae of all three species were most abundant in running water and were all found commonly in association. Their appearance stands in direct relation to the time of flooding of the fields. At the first flooding and after ploughing, they may be found 7 days later, and after subsequent floodings they appear in from 2 to 3 days, this variation being dependant on the time required for the development of algae, etc. Drying the fields is useless as a means of destroying the larvae if any hollows are left in which they can survive until the next flooding; this should not be done until the field has been exposed to the action of the sun for three whole days. The larvae will survive heating of the water up to 40° R. [122° F.], and they are equally resistant to high concentrations of salt, though they apparently do not tolerate an acid medium.

(K1822) Wt P.23/D.16 1,500 8/24 H & Sp Gp 52 H

Bonne (C.). **La leishmaniose cutanée dans la Guyane hollandaise.**—*Bull. Soc. Path. exot.*, xvii, no. 4, pp. 293–295. Paris, 1924.

Various forms of cutaneous leishmaniasis occur in Dutch Guiana, the disease being exclusively contracted in the forests of the interior. Owing to the abundance of ticks they have been suspected as vectors, but experiments with *Amblyomma cajennense*, F., and other species of this genus proved negative. *Phlebotomus squamiventris*, Lutz & Neiva, occurs in large numbers in the interior but is entirely absent along the coast, its distribution coinciding with that of the disease, but no infection resulted after crushing the few specimens obtainable and applying them to superficial abrasions.

Schulze (P.). *Ixodes apronophorus*, **n. sp., eine neue deutsche Zecke von** *Arvicola amphibius*, **L.** [*I. apronophorus*, sp. n., a new German Tick from *A. amphibius*.]—*Zool. Anzeiger*, lix, pp. 281–284, 5 figs. Leipzig, 1924.

Ixodes apronophorus, sp. n., is described from the water rat, *Arvicola amphibius*, in Brandenburg.

Joffick (S. D.). **Observations on Kerosene as a delousing Agent.**—*China Med. Jl.*, xxxviii, no. 4, pp. 318–322. Shanghai, April 1924.

In experiments to test the efficiency of kerosene in destroying lice, it was found that it often immobilises, but does not always kill these parasites. It is an effective insecticide for clothing only if used in a closed space where evaporation is prevented. Methods recommending a spray or even a complete anointing of the body with it are not safe, and in no case should they be relied on as the only method of disinfection.

Davey (J. B.). **The Outbreak of Human Trypanosomiasis** (*Trypanosoma rhodesiense* **Infection**) **in Mwanza District, Tanganyika Territory.**—*Trans. R. Soc. Trop. Med. Hyg.*, xvii, no. 8, pp. 474–481. London, 21st February 1924.

The author's summary and conclusions, which are largely contradictory of those of both Swynnerton and Duke [*R. A. E.*, B, xi, 52, 63], are as follows : The outbreak was almost certainly in full swing before the famine of 1919–20. It is more probable that infection was derived from game than that it was introduced in invading military units at a later date. Infection is acquired from the tsetse in the forest. Whatever may have been the case early in 1922, the evidence of 1923 all points to transmission by cyclically infected flies. There is ample evidence that game is, and has for years been, comparatively plentiful in the area. The hypotheses are untenable that (i) the fly has been consistently driven to feed on man owing to scarcity of game and (ii) the oft-demanded experiment in game destruction has been practically carried out in the area. The probable importance of infected man as a source of infection of the fly in sleeping sickness areas has been under-estimated. The relative importance of men and infected game in this respect is problematical. The outbreak is another link in the chain of evidence that wherever game infected with the *brucei*-type of trypanosome, flies of the *Glossina morsitans* group and man are brought into sufficiently

close contact, cases of human infection will arise ; they may escape detection for years. Cultivation of the soil is the only radical preventive of tsetse-fly and trypanosomiasis in Africa. The proximity of numbers of wild game is inimical to cultivation. The facts which are known regarding the Mwanza outbreak do not, in any way, invalidate the general conclusions on *Trypanosoma rhodesiense* infection of man reached by the Royal Society's Scientific Commission to Nyasaland.

WILLIAMSON (K. B.). **The use of Gases and Vapours for Killing Mosquitoes Breeding in Wells.**—*Trans. R. Soc. Trop. Med. Hyg.*, xvii, no. 8, pp. 485–519, 4 figs. London, 21st February 1924.

Gas, like oil, operates upon the water-surface, which in a well of uniform cross section is the narrowest front open to attack ; but much less of a highly toxic liquid is needed, even in a small open well, than would cover the water with a thin film ; and for equal toxic effect a much lower concentration of gas or vapour is required than the equivalent concentrations of the strongest dissolved or emulsified poisons. The practicability of gases depends on their proper selection and methods of generating and conserving them in wells. Insoluble vapours cause no pollution of the water, and soluble gases only very slight contamination, which by its germicidal effect on the pH may be beneficial (chlorine, sulphur dioxide, etc.). The gas or vapour selected should be denser than air and generated cold at the water level. However, 3 oz. of paraformaldehyde per square yard, vapourised by heat at the bottom of a 3 ft. open shaft, killed nearly half the experimental larvae of *Anopheles maculipennis* within 32 minutes, whilst 2½ lb. of sulphur per 1,000 cu. ft. of air, burned with the help of wicks, killed all larvae of *A. bifurcatus* present in wells of a cistern type, if they were kept closed from 3 to 4 hours. In a closed iron container, 1 lb. 6 oz. of sulphur per 1,000 cu. ft. of air was effective within an hour and a half. Sulphur dioxide is unsuitable as a direct gaseous poison, but when generated continuously by the evaporation of thionyl chloride, it is likely to prevent breeding by altering the pH of water. Wells should be closed whenever possible. This may be done by means of a portable parachute designed to cut off a small closed chamber above the water, details of which are described and illustrated. Small quantities of gas or vapour are, however, effective even in small open wells.

Gassing, when carried out continuously, will abolish mosquito breeding for a long period of time by a single operation, thus effecting a great economy of labour. Chloropicrin, evaporated from a cotton wick in an open artificial well 3 ft. 6 in. deep, killed all larvae and pupae of *A. maculipennis* and *Culex pipiens* within three days in an exposed situation out of doors. It is practically certain that a concentration of considerably less than one 5-millionth of a gram of the vapour per c.c. would kill all larvae and pupae within a week. To maintain this concentration at the bottom of a shaft 10 ft. deep, theoretically about 10 grams of chloropicrin require to be evaporated annually per square yard (12 grams per sq. m.) in still air. A floating continuous evaporator maintained at the side of a well is illustrated.

Flake naphthaline at or near saturation strength (about 1 in 40,000 at 15° C. [59° F.]) killed larvae of *Aëdes* (*Ochlerotatus*) *punctor* within 3 hours 56 minutes ; the pupae were more resistant.

Collating the results of previous workers with dissolved and emulsified poisons, sodium cyanide and prussic acid gas as well as for organic vapours, the intrinsic toxicity of prussic acid gas is 55 times, and that of chloropicrin vapour 25 times, that of dissolved cyanides at the highest estimate of the latter's toxicity for mosquito larvae ; and chloropicrin vapour is intrinsically more than 10,000 times more toxic than corrosive sublimate, despite the fact that larvae cannot escape from, or avoid ingesting, this and other dissolved poisons. The intrinsic toxicity of most of the other vapours tested ranged from approximate equality with that of chloropicrin to 7 or 8 times less, the average being about 4 times less. Gases and vapours are therefore by far the most potent known chemical agents for the destruction of mosquito larvae and pupae. Pure sulphuretted hydrogen, and chloropicrin at saturation strength, kill larvae of *C. pipiens* and *A. maculipennis* within a minute of their rising to the surface. A concentration of 1 in 200,000 of chloropicrin vapour is required to be maintained for 20 minutes over the water in order to kill all larvae of *A. maculipennis* at a temperature of about 23° C. [73·4° F.]. High but undetermined concentrations of chlorine, obtained by displacement of air, on the average killed all larvae and pupae of *A. bifurcatus* if maintained for about three minutes over the water. The larvae and pupae of both Anopheline and Culicine mosquitos are on the average about equally susceptible to atmospheric poisons, but the eggs of *A. maculipennis* are at least 6 times more resistant to chloropicrin vapour than the larvae.

Paralysed larvae sink, and with most poisons, especially such as are highly irritant or corrosive, do not recover. They do survive, however, if covered by shallow water after paralysis with narcotic poisons such as carbon dioxide, acetylene, and in the case of Anopheline larvae, at least, low concentrations of carbon bisulphide, etc. Though narcotised larvae are often able to survive immersion longer than healthy ones, they are liable to be drowned in deep water. Narcotised pupae usually float and recover while at the surface. Suitable poisons at sufficient concentrations maintained long enough, allowing a small margin for safety, will kill practically all larvae and pupae. The larvae of *Taeniorhynchus, A. bifurcatus* hibernating below water, and occasionally the first stage larvae of *Aëdes*, which appear to possess especially efficient anal gills, are exceptions to this general rule. Incompletely paralysed larvae tend to recover under water from the effect of all poisons, apparently eliminating or neutralising them. It is improbable that low concentrations maintained continuously will prevent the adults from entering the wells, though they may prove fatal to or at least derange their reproductive functions.

HAUGHWORT (F. G.) & WADE (H. W.). **The Fifth Congress of the Far Eastern Association of Tropical Medicine.**— *Amer. Jl. Trop. Med.*, iv, no. 3, pp. 233–276. Baltimore, Md., May 1924.

In this report the authors summarise the various papers read at the Congress, including the following :—

In his opening address on malaria Dr. Malcolm Watson reviewed recent advances in malaria, but pointed out that progress in anti-malarial work is hindered by absence of knowledge on certain points. It is not known why one species of *Anopheles* is a carrier and not another closely resembling it, why one species lives in one place and one in another. There are also grounds for thinking that the same species is not equally dangerous in different countries.

Dr. A. R. Wellington dealt with the history of malaria in Gemas, F.M.S., which is a junction on the railway to Siam. The building of the line in 1905 created conditions favourable to mosquitos, and in 1918 it became difficult to maintain a staff there. Entomological investigation showed that the mosquitos present were *Anopheles maculatus*, *A. subpictus* (*rossi*) and *A. kochi*, occurring in small open pools; *A. minimus aconitus*, *A. fuliginosus*, *A. hyrcanus* (*sinensis*) and *A. barbirostris*, in large open pools; and *A. umbrosus*, *A. tessellatus*, *A. leucosphyrus* and *A. aitkeni*, in jungle-covered pools. The important point was that *A. maculatus* was never found in jungle-covered ravines, but was very prevalent wherever the valley had been cleared sufficiently to let in the light. *A. umbrosus* was common in shaded pools.

In spite of recommendations to the contrary, trees continued to be felled and the jungle cleared in the ravines. The result was that six months later important changes were found to have taken place in the Anopheline fauna. The comparatively harmless *A. aitkeni* and *A. leucosphyrus* had disappeared from the valleys and were being replaced by the very dangerous *A. maculatus*. In the felled flat land *A. hyrcanus* and *A. barbirostris* had replaced *A. umbrosus*. Subsequently a definite campaign, under entomological supervision, was conducted with markedly good results against *A. maculatus*, it having been shown that *A. umbrosus* had done little harm. The jungle was allowed to stand.

The conclusion is drawn that clearing, drainage and oiling must be conducted on scientific principles under entomological supervision and must be checked by frequent mosquito surveys.

Dr. M. Koidzumi gave a summary of an extensive study of the Anophelines of Formosa, comprising *Anopheles hyrcanus*, Pall.; *A. minimus*, Theo.; *A. maculatus*, Theo.; *A. fuliginosus*, Giles; *A. tessellatus*, Theo.; *A. leucosphyrus*, Don.; *A. pleccau*, Koidzumi; *A. candidiensis*, Koidzumi; *A. splendidus*, Koidzumi; and *A. hatorii*, Koidzumi. In Taihoku the dominant species is *A. hyrcanus*, although *A. tessellatus* is occasionally encountered, while *A. minimus* is common in the hilly suburbs. Spring and autumnal swarming of *A. hyrcanus* were noticed. Hibernating larvae appear early in April, and the adults steadily increase up to mid-May, when a steady decrease begins. Even very violent typhoons are not destructive to mosquitos. On the contrary, an increase is often noticed, and large numbers of larvae are sometimes found in temporary pools.

Connor (M. E.). **Suggestions for developing a Campaign to control Yellow Fever.**—*Amer. Jl. Trop. Med.*, iv, no. 3, pp. 277–307, 8 figs. Baltimore, Md., May 1924.

The information here given is substantially a summary of the author's previous work on measures against *Aëdes argenteus* (*aegypti*) [*R. A. E.*, B, ix, 6, 128; x, 3, 177; xi, 45, 67, 104, 171, 203].

Shannon (R. C.). U.S. Bur. Ent. **Notes on the Maxillary Teeth of *Anopheles*.**—*Proc. Ent. Soc. Wash.*, xxvi, no. 5, pp. 142–143. Washington, D.C., May 1924.

An examination of the maxillary teeth of *Anopheles maculipennis*, Mg., was made to ascertain whether they varied in number in this species in different parts of North America and how such differences

correspond to the findings of Roubaud [*R.A.E.*, B, x, 53]. The number of teeth seems to run consistently higher in the more northern and non-malarial regions of North America, with an average of 17·3 teeth per maxilla. This in a general way corresponds to Roubaud's statement that races of *A. maculipennis* that confine their attacks exclusively to cattle and horses and probably other thick-skinned animals have a larger number of teeth than those that preferably feed on man.

Departmental Activities. Entomology.— *Jl. Dept. Agric. Union S. Africa*, viii, no. 5, p. 451. Pretoria, May 1924.

During March, two complaints were received from the Western Transvaal of *Cordylobia anthropophaga* infesting man. This fly has not been reported for some years, but has evidently persisted in some localities, where its attack is regarded more or less as an ordinary event.

Hertig (M.) & Wolbach (S. B.). **Studies on Rickettsia-like Micro-Organisms in Insects.**— *Jl. Med. Res.*, xliv, no. 3, pp. 329–374, 4 pls. Boston, Mass., March 1924.

This study was undertaken with the object of determining the incidence of Rickettsia-like organisms in insects and to arrive at a basis for defining the limits of *Rickettsia* as a generic name. Certain *Rickettsia* are similar to symbionts in that transmission is *via* the egg, the most striking instance being that of the one found in *Cimex lectularius*. In the case of Rocky Mountain spotted fever, where a tick becomes infected with mammalian blood, the transmission of the parasite *via* the egg for many generations is not essentially different from such transmission where no external sources of infection are known. Many *Rickettsia* can be considered only as more or less harmless parasites, well adapted to living in Arthropod tissues, although the typhus organism is somewhat pathogenic to the louse. The pathogenicity of the three forms of *Rickettsia* causing disease in man would seem to be either an accidental or acquired characteristic so far as the group is concerned. In the case of trench fever and typhus an Arthropod reservoir of the parasite is unknown, while in Rocky Mountain spotted fever, although the infection may persist for generations in the tick, it is by no means certain that the parasites can be definitely maintained in ticks. To what extent the non-pathogenic *Rickettsia* of other blood-sucking insects get into the blood of vertebrate hosts is almost wholly unknown. The nature and relationship of the *Rickettsia* are discussed. It is as yet impossible to designate their systematic relationships, and even a satisfactory basis for defining *Rickettsia* as a genus has not been found. The type of the group or possible genus, *R. prowazeki*, is itself a pleomorphic organism. In addition, the question of possible life-cycles for at least some of these organisms is yet to be settled. The results of present and past observations established the fact that minute micro-organisms morphologically and tinctorially similar to the pathogenic *Rickettsia* are widely distributed in Arthropods, without relation to their feeding habits. Between the two extremes, the true symbiont invariably present and specific for a given species of insect (*R. lectularia*) and those that are pathogenic both to vertebrates and

their insect hosts (*R. prowazeki*), is the parasite of Rocky Mountain spotted fever which is non-pathogenic to the Arachnid host and is transmitted hereditarily. Its rôle in the tick is probably rather that of a harmless parasite than of a symbiont. Should its indefinite perpetuation in the tick be possible, its very restricted distribution in these Arthropods is difficult to account for without assuming that it is a parasite in process of adaptation to the tick. Although a series of Rickettsia-like micro-organisms may be arranged according to the degree of perfection of adaptation to their Arthropod hosts, the majority of the non-pathogenic micro-organisms in insects, such as the gram-positive bacteroids of Blattids and the symbionts of Pediculids, are wholly unlike *Rickettsia*. With all these considerations in mind, it seems unfortunate that specific names have been given to non-pathogenic Rickettsia-like micro-organisms.

A possible grouping of the forms of *Rickettsia*, which may be justified by further study, is outlined.

Parker (R. R.), Spencer (R. R.) & Francis (E.). **Tularaemia. xi. Tularaemia Infection in Ticks of the species** *Dermacentor andersoni* **Stiles in the Bitter Root Valley, Mont.**—*Pub. Health Repts.*, xxxix, no. 19, pp. 1057–1073. Washington, D.C., 9th May 1924.

The following is taken from the authors' summary: The occurrence of tularaemia in the Bitter Root Valley, in western Montana, has been demonstrated by the recovery of *Bacterium tularense* from the tick *Dermacentor andersoni*, collected under natural conditions. Virulent organisms were recovered from unfed adult ticks collected 19th May 1923. Since infection must have been acquired from an infected host by an antecedent stage, which could not have fed later than the summer of 1922, winter survival in the tick during a period of at least 8 months is indicated. Larvae of *D. andersoni* (the progeny of one female) were infected with *Bacterium tularense* by permitting them to engorge on infected guinea-pigs. Under laboratory conditions these ticks were reared to the adult stage in less than three months. From the adults, infection was repeatedly recovered by subcutaneous injection or intraperitoneal inoculation into guinea-pigs. Snowshoe rabbits (*Lepus bairdi*) and woodchucks (*Marmota flaviventer*) have been shown to be susceptible to tularaemia. These rodents are important hosts of *D. andersoni*, and also of the rabbit tick, *Haemaphysalis leporis-palustris*, the engorged larvae of which have been shown to contain virulent *Bacterium tularense* 114 days after the infective larval feeding. Actual stage to stage transmission, however, has not yet been established as occurring in this tick.

It is probable that *D. andersoni* is a factor in the maintenance of tularaemia because (1) infection acquired by immature ticks can be passed on to subsequent stages of the same generation; (2) nymphs and adults are able to transmit infection by feeding; (3) *Bacterium tularense* is able to survive in the tick during hibernation, and (4) the tick infests rodent hosts known to be susceptible. It is likely that some of the adults of *D. andersoni* which feed on man are infected with *B. tularense*. There is as yet no definite evidence, however, to indicate what part this tick may play in human infection.

Logé (—) & Bizard (E.). **Sur 4 cas de piroplasmose équine** (*Piroplasma caballi*) **observés dans le département de la Loire-Inférieure.** —*Bull. Soc. Path. exot.*, xvii, no. 5, pp. 347–354. Paris, May 1924.

Four cases of equine piroplasmosis are described from Montoir (Loire-Inférieure), which was one of the principal American bases during the War. In 3 of these cases the horses in question were pastured in meadows enclosed by hedges where ticks were abundant. The owners of the animals had always known of the occurrence of the ticks, but declared that they had observed no sign of illness prior to 1922. The organism discovered in each case was *Piroplasma caballi*. The authors remark that this is apparently the first record of equine piroplasmosis in France, but M. Mesnil adds a note to the effect that he has received a report from MM. Donatien, Lestoquard & Sausseau, in which they relate the discovery of *Nuttallia equi* in a mule one day old in Poitou.

Anderson (C.). **Note concernant la toxoplasmose du Gondi.**—*Bull. Soc. Path. exot.*, xvii, no. 5, pp. 354–355. Paris, May 1924.

With a view to investigating the theory that *Toxoplasma gondii*, a disease of the gundi (*Ctenodactylus gundi*), is inoculated by an invertebrate vector [*R. A. E.*, B, vii, 58], the author imported some of these animals from Tunisia and kept them in cages at the Pasteur Institute. Two cases of natural infection were observed, on the 29th and 34th days of captivity, during April-May. The animals all died, and post-mortem examinations revealed abundance of *Toxoplasma*. Intraperitoneal passage through a mouse produced typical ascites. The dead gundis and their cages were all thoroughly examined, with the result that one individual of *Dermanyssus gallinae* and four of *Laelaps stabularis* were found on the animals, as well as many of the latter in their bedding. The author considers that *L. stabularis* should be added to the list of possible vectors and that further investigations with it should be made.

Charrier (H.). **Le Paludisme dans la région de Tanger (Maroc).**—*Bull. Soc. Path. exot.*, xvii, no. 5, pp. 355–360, 1 map. Paris, May 1924.

The author gives a topographical description of the district around Tangiers (with a map) and of the present breeding-places of mosquitos, and discusses the danger of increasing these and the consequent incidence of malaria, at least for a time, if the projected port and the Tangiers-Fez Railway are built.

Sergent (Et.), Gueidon (E.), Bouguet (A.) & Catanei (A.). **Existence de la leishmaniose cutanée chez le chien dans une localité du Tell algérien où le bouton d'Orient est endémique chez l'homme.** —*Bull. Soc. Path. exot.*, xvii, no. 5, pp. 360–361. Paris, May 1924.

The finding of numerous *Leishmania* parasites in cutaneous ulcerations of a dog in a small village of the Mila region (Constantine Department) of Algeria, where several cases of Oriental sore have recently been reported [*R. A. E.*, B, xii, 107], is recorded.

Bathellier (J.). **Premiers résultats zoologiques de l'étude des rats et des puces à Phnom-Penh.**—*Bull. Soc. Path. exot.*, xvii, no. 5, pp. 372–375. Paris, May 1924.

Three species of mammals occur in Pnom-Penh, Cambodia, that might be reservoirs of plague: *Mus decumanus* (constituting 55½ per cent.), *M. rattus* (40 per cent.) and *Crocidura* sp. (4½ per cent.). In the Chinese quarters, which are over-populated and form plague centres, *M. decumanus* is predominant, while *M. rattus* is common in the suburbs. With both these species a shrew-mouse (in the English Indies and Indo-China generally *C. coerulea*) is commonly associated. All three of these mammals harbour the same ectoparasites, four-fifths of which are *Xenopsylla cheopis* (the plague-transmitting flea) and one-fifth *X. astia*, which is considered as probably incapable of transmitting plague. On *Crocidura* sp. three female fleas were taken, two being *X. cheopis* and one *X. astia*. A small unidentified Ixodid tick was also frequently found, as well as a louse of the genus *Polyplax*. Experiments to determine the possible rôle of the shrew-mouse as a vector of plague in India have been negative, nevertheless the fact that it harbours the same parasites as the rat should be borne in mind.

Leger (A.) & Couput (A.). **Nasomyiase à *Chrysomyia dux*, Esch.**—*Bull. Soc. Path. exot.*, xvii, no. 5, pp. 375–376. Paris, May 1924.

In all previously related cases of nasal myiasis from Annam, the species recovered have been recorded as *Cochliomyia macellaria*, F. As, however, this fly seems to be strictly limited to America, Brumpt suggested that the species found in Tonkin and Cochin-China was probably *Chrysomyia bezziana*, Vill. A case is now recorded from Hué (Annam) in which 70 larvae were drawn from the nasal cavity of a patient and were reared and identified as *Chrysomyia dux*, Esch.

van Hoof (L.). **Conservation du pouvoir infectieux de l'*Ornithodorus moubata* nourri sur reptiles et sauriens.**—*Bull. Soc. Path. exot.*, xvii, no. 5, pp. 376–378. Paris, May 1924.

In furtherance of the work of Rodhain [*R. A. E.*, B, x, 219] experiments are described that have been undertaken with a view to testing the persistence of infection with *Spirochaeta duttoni* in *Ornithodorus moubata* when subjected to exceptional diet. The experiments prove that the tick can feed on chameleons and on small snakes and will attack them spontaneously, but that this food is very unsuitable as the blood, particularly of the chameleon, is very indigestible to it. Death frequently results, both among adults and reared individuals; the infective power, however, remains both in the case of adults and their descendants, even when kept for a long time on the same diet. It is probable that the forms of the spirochete that are confined in the sexual glands are not affected by the presence of foreign blood in the digestive tract, any more than by prolonged fasting of the host.

Blanc (G.) & Caminopetros (J.). **La "Tick Paralysis" observée sur les moutons de la région de Sitia (Crète).**—*Bull. Soc. Path. exot.*, xvii, no. 5, pp. 378–381. Paris, May 1924.

Tick paralysis has been observed among the sheep of Sitia (Crete), which are affected from late autumn until February or March. Except during this period only a few sporadic cases occur. In certain years

very severe epizootics may arise, affecting more than one-third of the individuals. When the first symptoms of disease appear the shepherds frequently seek for the ticks, particularly behind the ear of the animal, and remove them by covering them with oil. They affirm that recovery frequently follows this treatment when applied early enough. Epizootics appear fairly regularly every second year, with a corresponding abundance of ticks. Ticks collected on sheep in Sitia, though not taken from affected sheep, proved to be *Ixodes ricinus* and *Haemaphysalis punctata*. Both these ticks are vectors of tick paralysis in other countries. It is hoped, during the next epizootic, to make a further study of the disease.

LE CHUITON (F.). **Recherches sur l'épidémiologie de la filariose (*Filaria bancrofti*, Cobbold, 1877) en Cochinchine.**—*Bull. Soc. Path. exot.*, xvii, no. 5, pp. 405–409. Paris, May 1924.

A study of the occurrence of *Filaria bancrofti* in Cochin China has shown that it is far commoner than was supposed. It has been suggested that cases of the disease are merely introduced, but the authors give reasons for considering that it is transmitted locally. Conditions are all favourable for its propagation ; its mosquito hosts (*Culex* and *Stegomyia*) are abundant in the marshy country. Hygrometric and temperature conditions have enabled its development in *C. pipiens* to be followed ; development was completed in 10 days with temperatures of 80·6°, 95° or 98·6° F., 80·6° being the most favourable and also the mean annual temperature in Cochin China. Anti-mosquito measures should therefore be practised, not only against Anophelines, but also against Culicines, which are town-dwellers and transmit filariasis.

BLANCHARD (M.) & LAIGRET (J.). **Recherches sur la transmission d'*Onchocerca volvulus* par divers parasites hématophages.**—*Bull. Soc. Path. exot.*, xvii, no. 5, pp. 409–417. Paris, May 1924.

With the purpose of investigating the methods of transmission of *Onchocerca volvulus*, the authors have experimented with a number of haematophagous parasites, and the result of each experiment is given. The cases observed came from a region to the west of Brazzaville in the French Congo. All the parasites tested, whether biting parasites or blood-suckers, proved capable of ingesting, while feeding on a person infested with *O. volvulus*, the embryos disseminated in the derma of the host. The tick, *Ornithodorus moubata*, in particular, was sometimes found to ingest and engorge a considerable quantity of microfilariae which were later found in its digestive tract. *Cimex lectularius* only ingested these embryos in small numbers and very irregularly. This might seem to be because these insects engorge more rapidly than ticks, but Simuliids, which also engorge rapidly, sometimes ingest numerous microfilariae. It therefore seems more logical to suppose that some tropism enters into the question, attracting the microfilaria towards the point of suction, this tropism being most marked in the case of ticks, rather less so for Simuliids, larvae of *Auchmeromyia luteola* and leeches, and almost absent in bugs. The microfilariae seem to be rapidly digested by the parasite except in the case of *Ornithodorus moubata*, which exhibited living and very active embryos several days after feeding. No development has been observed. Even in ticks, after preservation for 12 days, the embryos maintained their

normal morphology, and their migration towards the intestine of the host was never observed. The microfilariae of *O. volvulus*, intradermic in man and extracted by ticks, are evidently incapable of penetrating spontaneously the shaved skin of the guinea-pig. Moreover, ticks interrupted in a feed on a person infested with *O. volvulus* and immediately transferred to a guinea-pig do not regurgitate the embryos that they have ingested. These facts are far from solving the problem of the transmission of *O. volvulus*, but they are considered to show that certain haematophagous parasites are capable, in the moment of biting, of exercising a tropism that attracts towards their mouth-parts the embryos contained in the derma of the infected person.

Human Trypanosomiasis in the Mwanza Area of Tanganyika Territory.—*Tanganyika Territory: Ann. Rept. Sanit. Br. Med. Dept., 1922*, pp. 117–123. [London] 1924.

Detailed reports on this outbreak of sleeping sickness in Mwanza (Tanganyika Territory) have previously been noticed [*R. A.E.*, B, xi, 52, 63]. The energetic measures taken by the senior commissioner to prevent the spread of the epidemic (which largely concerned the movement of natives and cattle and clearing of land) are described, and a programme is drawn up that in his opinion should be followed during 1923. The occurrence of an epidemic form of sleeping sickness so far removed from any previously reported outbreak is considered very serious, and had the outbreak arisen on the south-western side of Mwanza instead of to the eastward, the results would probably have been far worse. The western fly-belt shown on the German maps is about 270 miles from north to south and over 200 from east to west; this, with the areas infested with *G. palpalis* by Lakes Victoria and Tanganyika, and the *G. morsitans* area of Ruvuma, shows the potential danger to the Territory. It is considered essential that at least two specially qualified medical officers should be appointed to devote their time largely to sleeping sickness, one in the north-west area and the other in the south-east.

Cocoanut Palms and Mosquitoes.—*Tanganyika Territory: Ann. Rept. Sanit. Br. Med. Dept., 1922*, pp. 176–177. [London] 1924.

Collections of water from the tops of 804 coconut palms at Tanga were examined, 90 of them being found to contain mosquito larvae. *Aëdes argenteus* (*Stegomyia fasciata*) was bred from 29 collections, *Culex fatigans* in 22, *A.* (*S.*) *metallicus* in 9 and other Culicines in 4, these corresponding with the species found in the town during this period.

Arkwright (J. A.). **The Position of *Rickettsia* as an Aetiological Factor in Disease.**—*Jl. R. A.M.C.*, xlii, no. 6, pp. 447–452. London, June 1924.

Previous work on this subject is reviewed, from which the most probable and simple explanation appears to be that *Rickettsia* bodies are independent micro-organisms. The matter, however, cannot be regarded at present as entirely beyond the region of controversy, and rests on a different foundation from the surely established facts of the association of *Rickettsia* with disease.

SAMBON (L. W.). **The Elucidation of Cancer.**—*Jl. Trop. Med. & Hyg.*, xxvii, no. 11, pp. 124–174, numerous figs. London, 2nd June 1924.

This paper is preceded by an introduction by Sir William Simpson, briefly reviewing the work. Though the author's inquiry on the incidence of cancer in certain parts of Italy was only of a few weeks' duration, the results appear to open a promising field for exploration. In some villages the incidence of the disease was heavy whilst in others it was slight, and in the former certain of the animals as well as the people suffered from cancer. In many cases the incidence appeared to depend mainly on the degree of infestation of the house with cockroaches, the infestation being always greatest when the house was close to a bakery, mill, sugar refinery or other business favourable to the breeding of cockroaches. The species concerned was generally *Blatta orientalis*, usually found in the meal-ark, an indispensible article of kitchen furniture present in all farmhouses. The meal-flour also contained the meal-beetles, *Tenebrio molitor* and *T. obscurus*, the meal-moth, *Pyralis* (*Asopia*) *farinalis*, and the meal-mites, *Tyroglyphus* (*Aleurobius*) *farinae* and *T. longior*. In the stables adjoining the farmhouses, beneath the lucerne fodder heaps, cellar beetles (*Blaps gages* and *B. gibba*) were always found, as well as wood-lice (*Porcellio*), whilst mice, field mice and rats abounded everywhere. Cockroaches, meal-beetles, meal-moths, cellar-beetles and wood-lice all harbour within their body cavity or musculature the encysted larval forms of various kinds of flat and round worms, which spend their adult stage in the alimentary tract of domesticated animals and man. The most important are certain Spiruroidea of the genus *Gongylonema* and one or two small tapeworms of the genus *Hymenolepis*. Nematodes of the genus *Gongylonema* are of special interest with regard to the aetiology of new growths. A species found in the rat is a frequent cause of gastric carcinoma in these animals. Experimental feeding of healthy rats on cockroaches infested with *Gongylonema* almost invariably produces carcinoma of the stomach. Besides cockroaches, Tenebrionid and Scarabaeid beetles may foster these larvae, the normal hosts of which are apparently certain coprophagous beetles.

The various worms associated with different forms of cancer are enumerated, and though it is not contended that these parasites are the actual cause of cancer, it is suggested that they may be carriers or coadjutors of the specific organism, which finds favourable conditions for its activity in the irritation produced by the parasites in the invaded organs. In the cases referred to above the most common form of the disease was cancer of the stomach, not of the pyloric but of the cardiac end, and it is in the latter position that the larva of *Gongylonema* is found in cases of worm-induced carcinoma in rats. Should *Gongylonema* prove to be always associated with cancer of the cardiac end of the stomach, the knowledge could be made use of in the prevention of that particular form of the disease by controlling cockroaches in their breeding-places and by the protection of meal and other foodstuffs from this pest and rats.

The various theories so far propounded concerning the cause of cancer are reviewed, and in a series of appendices the author deals with the various worms implicated, and also traces the occurrence and life-history of the cockroaches from the earliest records. Some Spiruroidea and other helminths fostered and disseminated by Blattids and Tenebrionids are also discussed.

Becker (E. R.). **Studies on the Relationship between Insect Flagellates and** *Leishmania*.— *Amer. Jl. Hyg.*, iii, no. 4, pp. 462–468. Baltimore, Md., July 1923. [Received 22nd July 1924.]

The work of various investigators on the inoculation of mammals, birds, amphibians and fish with insect flagellates is reviewed, and a number of similar experiments are described. Attempts were made to infect white rats, white mice, a rabbit and a guineapig with *Crithidia gerridis* from the water-strider [*Gerris remigis*], *Herpetomonas muscae-domesticae* from Muscid flies, and *Trypanosoma melophagium* from the sheep-ked [*Melophagus ovinus*], but all were unsuccessful.

Glaser (R. W.). **The Survival of Bacteria in the Pupal and Adult Stages of Flies.**— *Amer. Jl. Hyg.*, iii, no. 4, pp. 469–480. Baltimore, Md., July 1923.

On pupating, the larvae of *Musca domestica* enclose a considerable number of bacteria within them. These bacteria persist through metamorphosis and pass on to the adult intestine, as is shown in experiments with recently emerged flies. In the case of *Stomoxys calcitrans* a much smaller number of bacteria is enclosed on pupation. Wild adults of *S. calcitrans* are free from bacteria, perhaps because their intestines inhibit the growth of bacteria that pass from the larvae. It must be remembered that new bacteria are not ingested by *S. calcitrans*, which feeds on sterile vertebrate blood, not being omnivorous like the house-fly. The pupae of *Lyperosia irritans* contain very few bacteria and there are very few in the intestine of a recently-emerged adult. The low pupal flora and practical adult intestinal sterility may be due to inhibition and destruction during transformation to and assumption of the adult stage.

Green (H. W.). **The Effect of Oil upon** *Anopheles* **Mosquito Larvae.**— *Amer. Jl. Hyg.*, iv, no. 1, pp. 12–22. Baltimore, Md., January 1924.

Experiments to ascertain the effect of various types of oil on Anopheline larvae are described, from which it is concluded that the heavier types of oil act by preventing the larvae reaching the outside air, the same results being obtained by physical means, whereas the lighter oils act by the penetration of the volatile gases through the tracheal tissues, thus poisoning the larvae and causing much more rapid death, which in the case of petrol resulted after 12 seconds. The rapidity with which the larvae die is dependent on the volatility and toxicity of the oil.

Anopheles larvae are killed quicker than *Culex* larvae.

Bull (C. G.) & Root (F. M.). **Preferential Feeding Experiments with Anopheline Mosquitoes. I-II.**— *Amer. Jl. Hyg.*, iii, no. 5, pp. 514–520, 1 fig. ; iv, no. 2, pp. 109–118, 1 fig. Baltimore, Md., September 1923 & March 1924.

In connection with a survey to determine the sources of the blood meal of malaria mosquitos [*R. A. E.*, B, xii, 43] it became desirable to know whether, if man, horses, and cattle were equally accessible, mosquitos would feed on one host in preference to the others. Roubaud and others believe that such a preference exists ; his observations do

not, however, furnish conclusive evidence that the domestic animals are actually chosen in preference to man. Tanzer & Osterwald have indicated that other influences may have caused the assembling of mosquitos in animal quarters [*R. A. E.*, B, viii, 62]. In the experiments described here care was taken to make the different hosts equally accessible. A hexagonal shed was used with 6 compartments of equal dimensions. Animals in any of the compartments were freely accessible. The work showed that the strain of *Anopheles quadrimaculatus* used manifested no decided preference between man, horses and cattle, as hosts. It was definitely shown that neither horses nor cattle afford absolute protection to man. If a preference was manifested in any direction, it was in favour of man. In comparing horses, cattle and man it was found that the individual was of greater significance than the species. The mosquitos would scarcely feed on chickens and rabbits even in the absence of other animals.

In localities where malaria is just maintaining itself, it would be quite possible to break the life-cycle of the malaria parasite by increasing the number of domestic animals, particularly horses, cows, and dogs. These animals should, of course, be kept in close proximity to the human dwellings, especially at night.

Freeborn (S. B.). **The Terminal Abdominal Structures of Male Mosquitoes.**—*Amer. Jl. Hyg.*, iv, no. 3, pp. 188–212, 18 figs. Baltimore, Md., March 1924.

The contents of this paper are indicated by its title.

Maxcy (K. F.). **Epidemiological Principles affecting the Distribution of Malaria in Southern United States.**—*Public Health Reps.*, xxxix, no. 20, pp. 1113–1127. Washington, D.C., 16th May 1924.

The object of this paper is to review the factors that affect the distribution of malaria, with particular reference to the southern United States, and to suggest an epidemiological classification of the localities in which the disease exists or is likely to exist. The different types of foci are classed as endemic, epidemic and potential. It is urged that sufficient field study should be made to establish the localities in which the disease is indigenous and the relative importance of different foci to the surrounding country from an epidemiological point of view. Efforts to control the disease must be ultimately directed toward the endemic centres.

The relative importance of the three common species of *Anopheles*, *A. quadrimaculatus*, Say, *A. crucians*, Wied., and *A. punctipennis*, Say, in the southern United States is still uncertain though evidence indicates that *A. quadrimaculatus* is responsible for more than 90 per cent. of the malaria.

Freitas (L.) & Barretto (C.). **A lucta contra a Malaria no Districto Federal de Rio de Janeiro e zonas limitrophes.** [The Campaign against Malaria in the Federal District of Rio de Janeiro and adjoining Areas.]—47 pp., with maps and illustrations. Rio de Janeiro, 1922. (Notice in *Ann. d' Igiene*, xxxiv, no. 5, pp. 360–361. Rome, May 1924.)

In this report on 4 years' work, *Anopheles* (*Cellia*) *tarsimaculatus*, *A.* (*C.*) *argyritarsis* and *A.* (*C.*) *albimanus* are thought to be the

species responsible for transmitting malaria. Measures against the larvae included the regulation of streams totalling about 300 miles in length.

GALLI-VALERIO (B.). **Beobachtungen über Culiciden nebst Bemerkungen über Tabaniden und Simuliden.** [Observations on Culicids, with Remarks on Tabanids and Simuliids.]—*Centralbl. Bakt. Paras. Infekt.*, Ite Abt. Orig., xcii, no. 1–2, pp. 101–104. Jena, 16th June 1924.

At Vidy, in 1922–23, larvae of *Anopheles bifurcatus* were present through the winter. The first larvae of *A. maculipennis* were found early in May. On 20th July there were large numbers of larvae of *A. bifurcatus* and *A. maculipennis* and of pupae of the last-named. On 26th September pupae of *A. maculipennis* were still found, but by 17th October they had disappeared completely, only larvae of *A. bifurcatus* being present.

At Vidy the summer of 1923 was peculiar inasmuch as the larvae of *A. maculipennis* were found in places where they had not been seen previously. The author agrees with Martini [*R. A.E.*, B, xi, 73] that drought is not necessarily related to a decrease of mosquitos, for as observed in 1921 [*R. A.E.*, B, x, 7] the mosquitos adapt themselves to new breeding-places. Notes on the seasonal incidence of several Culicines are also given.

The author does not agree with the theory of the existence of exclusively "misanthropic" races of Anophelines or with the conclusion that domestic animals form a protection against malaria. He also denies that the structure of the mouth-parts is changed through adaptation to animals [*cf. R. A.E.*, B, x, 53].

Tabanids were not numerous in 1923. On Alpine pastures they began biting in June. The author was attacked by *Tabanus aterrimus*, *T. bromius* and *Haematopota pluvialis*. *T. bovinus* did not occur at the altitudes of about 6,000 ft., where the others were found.

Simulium gallii was scarcer than in 1922. Swarms appeared at altitudes of 6,000 ft., but disappeared in windy weather.

ADAIR (E. W.). **Notes sur** *Periplaneta americana*, **L. et** *Blatta orientalis*, **L. (Orthop.).**—*Bull. Soc. R. ent. Egypte*, xvi (1923), pp. 18–38, 5 figs. Cairo, 1924.

The manner of deposition of the ootheca of *Blatta orientalis*, L., and of *Periplaneta americana*, L., is discussed from the works of various writers and from the observations of the author. The form of the ootheca is described and the method of hatching and development and habits of the Blattids are explained. The author has several times obtained the parasite, *Evania appendigaster*, L., from the oothecae of *B. orientalis*, and believes that *E. dimidiata*, F., is a parasite of the same species.

BUXTON (P. A.). **A Key to the Fourth Stage** *Anopheles* **larvae of Palestine (Dipt.).**—*Bull. Soc. R. ent. Egypte*, xvi (1923), pp. 45–50, 6 figs. Cairo, 1924.

This key is based on that by Edwards to the Palearctic species [*R. A.E.*, B, x, 18], with some alterations and additions.

METCALFE (A. J.). **A General and Medical Survey of Thursday Island.** —*Health*, ii, no. 3, pp. 65–73, 1 map. Melbourne, May 1924.

It is believed that no case of malaria has ever arisen in Thursday Island. Anophelines are rare, and the prevalent mosquitos are *Aëdes* (*Stegomyia*) *argenteus* (*aegypti*) and *Culex fatigans* (*quinquefasciatus*), the former being very common in the majority of houses, breeding chiefly in household tanks. A survey of the island for filariasis has not yet been carried out, but only 3 cases have been treated in the last 14 years.

HORN (A. E.). **A simple Device for the Mosquito-protection of Water-tanks, Casks, etc., without the Use of Gauze.**—*Jl. Trop. Med. & Hyg.*, xxvii, no. 12, p. 175, 1 fig. London, 16th June 1924.

A simple apparatus is described that does away with gauze protection and proves entirely satisfactory. It consists of a metal plate roughly 11 in. by 8 in. in size, with an opening in it about 6 in. by 5 in. On the lower surface a flange is welded around this opening, 1 in. deep at one end, with sides deepening to 2 in. at the opposite end. Impinging against the lower surface of this flange, and fitting accurately in apposition with it when closed, is a flat metal plate, which is hinged to a wire rod immediately behind the shallow end of the flange and with a small counterbalancing weight just sufficiently heavy to keep it apposed to the flange when at rest. The opening in the upper plate is guarded by a few crossed wires to prevent birds, lizards, etc., from falling through the trapdoor. The whole apparatus is galvanised and so rendered rust-proof. It is fixed by screws through its upper surface to the inlet in the top of the water-tank or cask, and receives the rain water coming through the down pipe. While at rest it remains completely closed by the counterbalancing weight and prevents the access of mosquitos. With water falling on it the trap swings open to allow a passage. It accommodates itself equally to the heavy rush of water from a tornado or the lighter fall from a slight shower, and although mosquito eggs may be washed from a defective roof gutter through the trap into the tank, it does not allow egress of the adult mosquitos, even while opened by the passage of water through it.

This trap was used with success in the Gambia, and required no attention. The apparatus can be obtained from Messrs. Fredk. Braby & Co., Ltd., 110, Cannon Street, London.

Third Report of the Hayling Mosquito Control. May 1923 to May 1924. —12 pp., 9 figs. Southsea [1924].

Further investigations have established the fact that the majority of South Coast districts having a low lying coastline are infested with *Aëdes* (*Ochlerotatus*) *detritus*. In addition to breeding in stagnating salt water, the mosquito exhibits other abnormal characteristics, such as an exceptionally long hatching-out season (at least 9 months of the year) and a much longer range of flight than that of any of the " fresh water " species. These include *A.* (*O.*) *rusticus* and *Theobaldia annulata*. The larvae of *A. rusticus* are found in large numbers in the stagnant water of neglected field or roadside ditches, whilst those of *T. annulata* exhibit a distinct preference for water that has become foul owing to sewage contamination or other causes. *Culex pipiens* is the common

domestic mosquito, its larvae are plentiful in water-butts and other water receptacles in the neighbourhood of dwelling houses. The distinguishing features of the females of the species dealt with are described, and a list of the known British mosquitos is given.

The destruction of mosquito larvae and the abolition of breeding-places has been continued as in previous years [*R. A.E.*, B, x, 185; xi, 121].

KISHIDA (K.). **An interesting Mite excreted with the Human Urine.**—*Dobutsugaku Zasshi* [*Zool. Mag.*], xxxiii, no. 398, pp. 438–443, 4 figs. Tokyo, 1921. [In Japanese.] (Abstract in *Jap. Jl. Zool.*, i, no. 1, p. 9. Tokyo, 1922.) [Received 1st July 1924.]

Tetranychina tuberculata, sp.n., is recorded from human urine. It is closely allied to *T. harti*, Ewing, and the characters distinguishing them are given.

CROSS (H. E.). **Transmission of Camel Mange to Man.**—*Vet. Jl.*, lxxx, no. 7, p. 273, 1 fig. London, July 1924.

Transmission of mange from camels to man is by no means rare. It causes great irritation and, not infrequently, suppurating sores. A treatment that gives good results is a daily bath and the application of Taramira oil or sulphur ointment and finally boracic ointment to the suppurating areas.

KENNEDY (J. C.). **Acarodermatitis urticarioides (Grain Itch) in Turkey.**—*Jl. R.A.M.C.*, xliii, no. 1, pp. 45–47. London, July 1924.

Cases are described found during the operations in Turkey in 1922–23, the clinical symptoms of which tallied with those of dermatitis caused by *Pediculoides ventricosus*. Several samples of grain and straw from infected billets were examined for the mite, but only an unidentified species of *Glyciphagus* was discovered. No special treatment was given, but it is necessary to take the usual precautions to prevent the skin lesions becoming infected. The disease is well known in certain parts of America and according to Walker has been reported in England.

TIMONEY (T. M.). **The Bionomics of the Sarcoptic Mange Parasite of the Buffalo, with some Observations concerning the relative Power of Resistance to adverse Conditions of the different Stages of the Acarus and of its Egg.**—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923*, pp. 180–200, 4 pls. Calcutta, 1924.

The two common forms of parasitic mange, sarcoptic and psoroptic, attack large numbers of the buffaloes used in the Punjab for serum production. The disease disappears from May to August, but is found during the rest of the year, both forms showing a predilection for the perineal region, the upper thigh and the neck. No instance of pure psoroptic infection was recorded. A method is described for observing the daily average number of eggs laid by the mites and for studying their life-cycle. The average number of eggs laid by an ovigerous female *Sarcoptes* under experimental conditions was 17 to 18, with

10 days as the maximum duration of life of an egg-laying female. The mite is full-grown 6 to 8 days after hatching. Results obtained from the study of the longevity of each stage of the parasite apart from its host, and the relative power of resistance of the different stages to the action of 10 per cent. creosote in olive oil, demonstrate that the ovigerous and pubescent females can withstand a longer separation from their host than can the other stages, and that an exposure of 20 minutes to the action of creosote in olive oil, warmed to 87·8° F. (31° C.) kills all males, nymphs and larvae, and the majority of ovigerous and pubescent females, and practically all eggs. The incubation period is 1 or 2 days in summer and 2 or 3 in winter. No egg, separated for 5 days from the host, hatched in the incubator at 77–80·6° F. (25–27° C.); and, after 7 days at room temperature at 50–55·4° F. (10–13° C.), no egg hatched when subsequently placed in the host's body. Sunshine prolongs and cold curtails the resisting powers of the mite.

IYENGAR (M. O. T.). **The Importance of Animal Prophylaxis in Malaria.**—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923*, pp. 203–214, 1 pl. Calcutta, 1924.

A summary is given of the work already done, chiefly referring to Europe and to *Anopheles maculipennis*, that has treated of the importance of cattle in the prevention of malaria.

In India there are as many as 35 species of *Anopheles* with different habits and distribution, and varying susceptibility to malaria. Of these nearly 50 per cent. have been known to transmit forms of the malarial parasites. The Indian species may be divided into four groups; (*a*) those that are essentially wild and that attack wild animals, occasionally domestic ones and very exceptionally man, and include *A. gigas*, *A. barbirostris*, *A. aitkeni*, *A. lindesayi* and probably also all forest forms, such as *A. plumbeus* (*barianensis*), *A. asiaticus*, *A. annandalei* and *A. culiciformis*; (*b*) those that feed chiefly on animals, including cattle, but are known to attack man, such as *A. hyrcanus*, *A. fuliginosus*, *A. jamesi*, *A. maculipalpis* and *A. maculatus* (the European *A. maculipennis* probably comes under this heading); (*c*) species that prefer man, but also attack animals, among which may be included provisionally *A. vagus*, *A. subpictus*, *A. jeyporensis* and *A. culicifacies*; (*d*) those that live solely on man, such as *A. minimus*, *A. listoni*, *A. varuna* and *A. stephensi*.

If the malaria-transmitting mosquito of a particular locality is of the second group, it would be easy to reduce the malaria appreciably by the introduction of live-stock, if of the third group some relief would be obtained by the introduction of animals, but if of the final group the introduction of animals would naturally be useless.

In the discussion that followed this paper, it was stated that while in Bengal *A. fuliginosus* is not a malaria carrier and has not been recorded from man, at Pusa it is very common as a pest of man, the possibility thus arising of a species falling into different classes in different localities. Another point of interest as regards animal prophylaxis is that in spite of cattle being very numerous in the Punjab and frequently occupying the same shelter as their owners at night, malaria is as prevalent there as in any other part of India.

Sen (S. K.). **Observations on the Bionomics of** *Aëdes* (*Stegomyia*) *albopicta*, **Skuse.**—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923*, pp. 215–225, 1 pl. Calcutta, 1924.

Detailed notes, made almost daily, from 28th August to 3rd November, with a view to finding out the rôle of blood in ovulation in mosquitos, are given. While nothing of much importance was achieved in this respect, the observations help to elucidate facts relating to the general bionomics of mosquitos, and of *Aëdes albopictus*, Skuse, in particular.

The following is a summary of the more important observations: No eggs were laid by adults fed on fresh goat's blood sweetened with sugar, although the ova appeared to be mature. Mosquitos dissected very soon after feeds of blood showed the imbibed food almost exclusively in the "stomach." No eggs were laid by unfertilised *A. albopictus* although allowed to bite and suck blood. *A. albopictus*, dissected immediately after emergence, as also after feeds, showed large numbers of bubbles in all the three oesophageal diverticula and sometimes in the alimentary tract. Eggs lost their viability on being subjected to prolonged desiccation. Warmth and exhaled carbon dioxide activated females of *A. albopictus*. Females of *A. albopictus* that emerged and fed simultaneously, oviposited at different periods. The life-cycle of *A. albopictus* from oviposition to emergence of adult was found to be 17 days in October at Pusa.

Fletcher (T. B.). **Carbon bisulphide not efficacious as a Mosquito Larvicide.**—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923*, pp. 226–227. Calcutta, 1924.

Experiments carried out with carbon bisulphide show it to be ineffective against mosquito larvae in India, however useful it may have been proved elsewhere [*R. A. E.*, B, xi, 9]. The few larvae that are killed are only those that come into direct contact with the poison.

Iyengar (M. O. T.). **Occurrence of a Coprid Beetle,** *Caccobius mutans*, **Sharp, in the human Intestines.**—*Rept. Proc. 5th Ent. Meeting, Pusa, February 1923*, pp. 201–202, 1 pl. Calcutta, 1924.

Besides species of *Onthophagus* already recorded [*R. A. E.*, B, x, 81] from the human intestine, *Caccobius mutans*, Sharp, is reported as infesting man. The beetles were passed on several occasions by the same person, a child of 5 years old. The species appears to be a very rare one, and little is known of its bionomics.

Fletcher (T. B.). **Intestinal Coleoptera.**—*Indian Med. Gaz.*, lix, no. 6, pp. 296–297. Calcutta, June 1924.

The occurrence of Scarabaeids in the human intestine is discussed. In view of the facts that only adult beetles have ever been passed in the recorded cases, and that in 6 out of 7 they were female beetles, also that with one exception all cases were children between the ages of 3 and 5, it seems to be most probable that the adult beetles, guided by their keen sense of smell and search for human excreta, themselves effect an entrance through the anus, when this part of the body is exposed, unprotected by clothing, during sleep in warm weather.

Otten (L.). **The Plague in Java (1911-1923).**—*Repts. Netherlands-Indian Civil Med. Service*, 1924, pt. 2, pp. 115–248, 7 pls., 2 maps. Batavia, 1924.

This is a summarised history of plague in Java since its occurrence in 1911. The origin, course, vectors, spread and repression of the disease are dealt with. A full account is given of the various rats found in the island. *Xenopsylla cheopis*, the commonest rat flea in the tropics, is generally distributed in Java and predominates both in the plains and in the mountains, being found on the domestic rat, *Mus rattus griseiventer*. Moisture being unfavourable to it, *X. cheopis* seldom occurs on outdoor rats such as the field-rat (*M. rattus diardii*) and *M. concolor*. The field-rat may frequently occur indoors when the fields are fallow ; it becomes a flea-carrier through close contact with the domestic rat and carries *X. cheopis* to the fields on its return there. *X. cheopis*, however, disappears in the fields during the rainy season, its larvae never being found there. *Pygiopsylla ahalae* is much less common than *X. cheopis*, because it needs a lower temperature and, especially, a higher degree of humidity. It therefore never occurs in the plains, an altitude of about 1,200 feet being the lowest at which it is found. It occurs in rice-fields, on dry ground, in coffee plantations and wooded areas, and also indoors at altitudes ensuring favourable conditions. After the rainy season it decreases rapidly on rats indoors. It is found both on field-rats and on *M. concolor*, and its larvae occur in all nests (as opposed to *X. cheopis*). *P. ahalae* is therefore mainly an outdoor flea, while *X. cheopis* occurs chiefly indoors.

Liston (W. G.). **The Milroy Lectures, 1924, on The Plague.**—*Brit. Med. Jl.*, no. 3308, pp. 900–903, no. 3309, pp. 950–954, no. 3310, pp. 997–1001. London, May-June 1924.

These lectures are a summary of the history, aetiology and epidemiology of plague.

Cilento (R. W.). **Malaria in Australia.**—Supplement to *Med. Jl. Australia*, 11th Yr., i, no. 20, pp. 315–317, 1 table. Sydney, 17th May 1924.

The facts set out in this paper are based upon actual surveys of the areas implicated. Certain occasional cases of locally-acquired malaria have been reported from the southern States and are of interest in that they indicate that in areas as yet malaria-free there are conditions occasionally suitable to the conveyance and spread of the disease. At the present date several endemic centres of malaria occur in the Northern Territory and Queensland and probably in Western Australia. Malaria of the present day appears to differ in type from that of 20 or 30 years ago, the earlier form being benign tertian with definite ague. The present malignant tertian form appears to have been introduced later and is tending to decrease naturally. The probable carriers in Australia are *Anopheles* (*Nyssorhynchus*) *annulipes* and *A.* (*Myzorhynchus*) *barbirostris* var. *bancrofti*, and of these the former has generally been considered the vector, but various writers have pointed out that there is as yet no justification for this assumption other than that it is the more common in regions where malaria is prevalent, and in some localities exists in quantities and is the sole

species found. The other species does not occur south of Brisbane nor is it found in localities where sporadic cases of locally-acquired malaria have been reported in New South Wales, Victoria and southern Western Australia.

Kidston (T. A.). **The Prophylaxis of Malaria as applicable to the Naval Service in Time of War.**—Supplement to *Med. Jl. Australia*, 11th Yr., i, no. 20, pp. 317–319. Sydney, 17th May 1924.

An account is given of methods of excluding mosquitos from ships, and of protecting landing parties; and the use of repellents, quinine prophylaxis, netting, oiling, clearing and drainage is discussed.

Cilento (R. W.) & Richards (R. E.). **Filariasis in Australia.**—Supplement to *Med. Jl. Australia*, 11th Yr., i, no. 20, pp. 325–327, 1 table. Sydney, 17th May 1924.

The history of filariasis in Australia is reviewed. The distribution of the disease may be described as being confined to a narrow coastal strip from the northern rivers of New South Wales to Cape York, including the south-eastern corner of the Gulf of Carpentaria. The Northern Territory is possibly infested to a slight extent and a similar condition may exist in the north-west of Western Australia. The parasite is definitely *Filaria bancrofti*, and has a well-marked nocturnal periodicity, related to the night-biting habits of its vector, *Culex fatigans*.

Newman (L. J.). **Longevity of the Fowl Tick** (*Argas persicus*).—*Jl. Dept. Agric. W. Australia*, 2nd Ser., i, no. 1, pp. 48–49, 1 fig. Perth, April 1924.

A female of *Argas persicus* (fowl tick) laid fertile eggs four months after isolation from its host and lived in isolation for 2 years 3 months and 2 weeks. The eggs hatched after nine days, but all the young ticks died within 3 months in the absence of a host. In a further test, males died four months after isolation, but two females lived for 3 years and one as long as 4 years 5 months. It is significant that the single isolated female did not live nearly so long as those placed together, the inference being that after a certain period the stronger sucked the body juices from the weaker. The removal of fowls from a house or yard is therefore useless with a view to starving out the tick unless they are absent for several years; extermination must be undertaken by direct measures, such as destruction by fire, or the application of caustic washes to infested premises.

Johnston (T. H.). **A Survey of the Australian Sheep Maggot-fly Problem.**—*Trans. & Proc. R. Soc. S. Australia*, lxvii, pp. 201–211. Adelaide, 22nd December 1923. [Received 18th June 1924.]

The author agrees with Froggatt [*R. A. E.*, B, x, 143] that the solution of the sheep maggot-fly problem lies in the destruction of the fly before it can deposit eggs or larvae on living sheep. Systematic destruction by burning or poisoning of carcases and carrion should be carried out, and co-operation amongst sheep owners is essential. Of

secondary importance is the utilisation of traps for the adults and of various Chalcids that attack either the larval or pupal stages. The preservation of insectivorous and carrion-feeding birds is highly desirable. Experimental work in Queensland has shown the value of applications to sheep of strong arsenical solutions. It is suggested that bacterial activity may be the prime factor in inducing blow-fly attack and that arsenical treatment may owe its protective efficacy to its bactericidal action. It may be advisable for breeders to dispense with wrinkled sheep as they are the most liable to infestation, and it may be necessary to breed an animal with very little wool on the breech. It is known that crossbreds are less liable to infestation than merinos. A change in the time of shearing may be advantageous, in order that sheep may not carry a heavy fleece during the autumn and spring, when attack by the flies is most likely.

HENRY (M.). **A Preventive of Sheep Blow-fly.**— *Agric. Gaz. N.S.W.*, xxxv, pt. 5, p. 353. Sydney, 1st May 1924.

For jetting sheep as a protection against blow-flies, the best results have been obtained from a solution of 7 lb. arsenic and 5 lb. soda ash boiled in a 10-gallon vessel for an hour and then made up with water to 100 gallons. This solution should be jetted into the breech of the sheep at a pressure of about 50 lb. For other parts of the animal the pressure should be varied, according to the growth of the wool, up to 100 or 120 lb.

KNIBBS (Sir G. H.). **Investigation of Stock Diseases.**—*2nd Ann. Rept. Inst. Sci. & Indust., 1922–23*, pp. 17–27. Melbourne, 1st February 1924.

Lyperosia exigua (buffalo fly), which occurs in the Northern Territory and possibly in Queensland, is regarded as a serious pest of cattle, and measures should be taken to prevent its spread to other parts of Australia. It is suggested that its distribution should be ascertained, and attempts made to introduce parasites and the scavenger beetles that attack the dung sheltering the larvae and pupae.

The work of the Special Committee on blow-flies in Queensland is briefly reviewed. During the year experiments were made in jetting [*R. A. E.*, B, xi, 75], dipping, and dressing with crude fuel oil. As dipping with 0·2 per cent. arsenic gave little protection the strength was gradually raised during the year to 0·5 per cent. Dipping is not so good a protection as jetting. Sheep should not be driven or overheated before or after dipping, which should not be after midday in winter nor after 4 p.m. in summer. There is no need to crutch sheep after dipping or jetting. Results of tests to determine the effect of arsenic content indicate that there is little absorption of arsenic by the wool. Definite recommendations as to the use of arsenic and oil mixtures cannot yet be made. Ordinary crude fuel oil is a good dressing for rams' horns, and is the most effective dressing in the case of extensive lesions, where dressings containing poison might be detrimental.

The economic loss to the Commonwealth by the cattle tick [*Boophilus annulatus australis*] and the work done against it are detailed [*R. A. E.*, B, xi, 68, 104].

An experiment was made to determine the persistence of arsenic on the skin of cattle after ordinary dipping. Twelve days after the usual second dipping a definite area of skin was washed with ½ gal. warm water and the washings were found to contain 3·5 parts per million arsenic.

FRIEDE (M.). **A Pest which may prove a Blessing.**—*Poultry Sci.*, ii, no. 6, pp. 181–188. Ithaca, N.Y., 1923. (Abstract in *Expt. Sta. Record*, l, no. 6, p. 576. Washington, D.C., 1924.)

Experiments in Russia have shown that the pupae of the large red ant, *Formica rufa*, make an excellent food for poultry, especially when fresh. They act as a stimulant to growth in young birds and to egg production in mature fowls. In a dried condition they are still a good food, but have not the same stimulating properties. Pupae of *F. pratensis* also gave good results, but not those of *Lasius flavus*.

STYLE (F. W.). **The Larva of the Warble Fly as a human Parasite.** —*Brit. Med. Jl.*, no. 3312, pp. 1086–1087. London, 21st June 1924.

A case is reported of three larvae of the warble fly, *Hypoderma lineatum*, Vill., being discharged from swellings in the face of a child 4 years old in Devon. The flies were prevalent on the farm where the child lived, and the eggs from which the larvae developed must have been laid either on a hair of the child's head or body, or, more probably, in the ordinary way on a cow's hair, and then swallowed in milk.

FERRIS (G. F.). **The New World Nycteribiidae (Diptera Pupipara).**— *Ent. News*, xxxv, no. 6, pp. 191–199, 1 fig., 1 pl. Philadelphia, Pa., June 1924.

The New World species of Nycteribiids have been referred to under five generic names, *Nycteribia*, *Basila*, *Penicillidia*, *Cyclopodia* and *Pseudelytromyia*, and of these the author recognises only the two former.

HOWARD (L. O.) & BISHOPP (F. C.). U.S. Bur. Ent. **The House Fly and how to suppress it.**—*U.S. Dept. Agric.*, Farmers Bull. 1408, 16 pp., 9 figs. Washington, D.C., April 1924.

This is a revision of an earlier bulletin on the bionomics and control of *Musca domestica* [*R. A. E.*, B, vi, 103].

SHANNON (R. C.) & DOBROSKY (I. D.). **The North American Bird Parasites of the Genus** *Protocalliphora* **(Calliphoridae, Diptera).**— *Jl. Wash. Acad. Sci.*, xiv, no. 11, pp. 247–253. Washington, D.C., 4th June 1924.

This paper deals primarily with the systematic treatment of the North American species of *Protocalliphora*, the larvae of which parasitise nestling birds. Keys to both sexes are given, and two new species, *P. avium* and *P. hirudo* described, as well as several new subspecies and varieties.

Blunck (H.). **Wirtschaftliche Bedeutung und Bekämpfung des Gelbrands.** [Economic Importance and Control of *Dytiscus marginalis*.]—*Zool. Anz.*, lvii, no. 9–13, pp. 207–224, 1 fig. Leipzig, 27th November 1923.

Dytiscus marginalis, L., and water beetles allied to it are among the most dangerous enemies of fish. The adults are a serious pest only in over-crowded or badly kept aquariums, but the larvae are extremely destructive to spawn and young fish, and, when numerous, may become a distinct menace to fisheries. Moreover, both adults and larvae by feeding on various water insects lessen the natural food supply of the fish.

Direct control recommended is regular collection of the beetles when the breeding tanks are drained and the use of trap-baskets in the spring. The larvae may be destroyed by oiling with petroleum, etc., but whether this would be harmful to the fish is uncertain. After draining, the tanks should be lime-washed ; the breeding tanks must be kept as clean as possible and free from unnecessary vegetation, left dry during the winter and stocked as late in the spring as possible.

Olsufev (G.). **Note sur un Coléoptère ectoparasite du Desman.**—*Bull. Soc. ent. France*, 1924, no. 7, pp. 94–96. Paris, 1924.

The bulk of this information concerning the Leptinid, *Silphopsyllus desmanae*, Ols., parasitising muskrats in Russia has already been noticed [*R. A. E.*, B, xii, 89]. The original description is here reproduced.

Lecomte (C.). **Sur les moeurs de** *Monomorium pharaonis* **L. (Hym. Formicidae).**—*Bull. Soc. ent. France*, 1924, no. 8–9, pp. 111–112. Paris, 1924.

Monomorium pharaonis, L., is recorded as occurring in large numbers in a maternity hospital in France, where, besides attacking provisions, etc., it was particularly attracted to newly born infants and especially those prematurely born, attacking chiefly the borders of the eyelids and ears. No serious injury was apparently caused, though it is possible that the hospital will have to be evacuated and the wards fumigated with sulphur owing to the abundance of this pest.

[Bening (A. L.).] **Бенинг (А. Л.). О "мошках" нижней Волги.** [Simuliids of the Lower Volga.]—**Работы Волжской Биол. Ста.** [*Arb. Biol. Wolga-Sta.*], vii, no. 3, pp. 84–89, 1 fig. Saratov, 1924. [With a summary in German.]

Two Simuliids, *Simulium* (*Schonbaueria*) *matthiesseni*, End., and *S.* (*Nevermannia*) *maculatum*, Mg., are widely distributed over the lower Volga region. *S. matthiesseni* is the more troublesome to man ; it appears as soon as the river begins to fall, being most abundant towards the middle and end of June. The larvae are found on the submerged branches of *Salix alba* and *Populus nigra*, but only where a strong current is present. The larvae of *S. maculatum* are found in similar positions, but do not require such a strong current. Neither species is recorded as a carrier of disease.

Of *S.* (*Cnetha*) *aureum*, Fries, and *S.* (*Wilhelmia*) *equinum*, L., isolated individuals were found in various districts.

Lenz (F.). **Die Chironomiden der Wolga. 1. Teil. Allgemeine Uebersicht über die quantitative und qualitative Verteilung der Chironomiden-Larven in der Wolga.** [The Chironomids of the Volga. Part 1. A General Review of the quantitative and qualitative Division of the Chironomid Larvae in the Volga.]—**Работы Волжской Биол. Ста.** [*Arb. Biol. Wolga-Sta.*], vii, no. 3, pp. 97–122, 4 figs. Saratov, 1924.

The Chironomid larvae here listed were collected along the Volga from Tver to the Caspian sea and include about 60 types. The term type has been chosen not in the sense of a systematic unit but rather in that of an ecological unit, as in most cases the material could not be identified beyond the genus. The subfamily Chironominae appears to be well represented, whereas Ceratopogoninae and Tanypodinae are comparatively rare. The topography is briefly discussed, and notes are given on the structure of the larvae of *Chironomus* and *Rheotanytarsus*.

[Yakimov (V. L.) & Vasilevskaya (V. I.).] **Якимов (В. Л.) и Василевская (В. И.). Протозоол. отдел Ленингр. Ветер.-Бактериол. Института. К вопросу о русских пироплазмозах крупного рогатого скота.** [Protozool. Dept. Leningrad Vet.-Bacteriol. Institute. On the Question of the Russian Piroplasms of Cattle.]—**Вестник Микробиол. и Эпидемиол.** [*Rev. Microbiol. & Epidemiol.*], iii, pt. 1–2, pp. 52–64, 1 pl. Saratov, 1924.

This subject is dealt with in two papers, the first of which discusses the piroplasms occurring in North-Western and Southern Russia. These are of two distinct types, *Piroplasma bigeminum* in the south, transmitted by the tick, *Boophilus annulatus calcaratus*, and *P. bovis* in the north, transmitted by *Ixodes ricinus*. *Dermacentor reticulatus* does not occur in Russia north of the parallel of Vitebsk, so that piroplasmosis of horses is also absent from north-western Russia. Owing to the localised distribution of the vectors, the spread of *P. bigeminum* from south to north is not considered likely.

In the second paper the senior author deals with the relation of the Russian piroplasms to those of the rest of Europe. He concludes that two types of piroplasms occur in Europe, the *bigeminum* type distributed over south Russia, Germany and England and probably Italy, and the *bovis* type occurring in north-western Russia, Finland, Esthonia, Sweden, Norway, Rumania (nothing is known about the other Balkan States), Hungary, France, Portugal, Belgium, Holland and Germany. It is possible that only one type, *P. bovis*, originally occurred in Europe, the *bigeminum* type having probably been imported. The term " type " is used in preference to species throughout as the absolute specific identity of the various piroplasms cannot be proved without transmission experiments.

[Pavlovski (E. N.).] **Павловский (Е. Н.). Зоологическая Лаборатория Военно-Мед. Академии. К методике исследования паразитических насекомых и подходящих к ним по величине членистоногих.** [Zoological Laboratory of the Army Med. Academy. On the Method of Studying parasitic Insects and Arthropods similar to

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them in Size.]—**Вестник Микробиол. и Эпидемиол.** [*Rev. Microbiol. & Epidemiol.*], iii, pt. 1–2, pp. 65–68, 1 fig. Saratov, 1924.

The method of preparing material for study is described as well as a special needle for dissection purposes. A paragraph is devoted to the preparation and fixation of objects with impermeable coverings.

Bonne (C.). **Conservation du Spirochète ictéro-hémorragique dans les Punaises.**—*C.R. Soc. Biol.*, xci, no. 23, pp. 242–243. Paris, 4th July 1924.

The author has not been successful in transmitting *Spirochaeta icterohaemorrhagiae* from infected to healthy guineapigs through the bite of *Cimex* [*lectularius*], but in one case a positive result was obtained by inoculating the crushed bug, in which case the bug had obtained the virus at least two days previously.

Chatton (E.) & Aubertot (M.). **Sur les phases et les voies d'extension des infections à** *Leptomonas* **intestinaux des Drosophiles. La non spécificité parasitaire du** *Leptomonas drosophilae*.—*C.R. Soc. Biol.*, xci, no. 23, pp. 283–286. Paris, 4th July 1924.

Experiments are described which show that *Herpetomonas* (*Leptomonas*) *drosophilae* is not exclusively a parasite of *Drosophila confusa* but is capable of establishment in *D. rubrostriata*, in which it may continue from generation to generation. Infection when first acquired either by the larva or adult is always endotrophic and remains so in the case of the larva. Endotrophic infection acquired by the adult may become peritrophic after a few days. The endotrophic infection of the larva always becomes peritrophic in the adult, and this change is described.

Brumpt (E.). **Particularités évolutives de l'** *Amblyomma agamum*.—*Ann. Parasit. hum. & comp.*, ii, no. 2, pp. 113–120, 3 figs. Paris, April 1924.

Observations made on the development of *Amblyomma agamum* (only attacking cold-blooded animals) are described in detail, from which, however, it cannot yet be stated whether this tick is becoming adapted to one host from being originally a three host species or *vice versa*.

Ewing (H. E.). U.S. Bur. Ent. **A new Mite from the Lung Sac of a Rattlesnake.**—*Proc. Ent. Soc. Wash.*, xxvi, no. 6, p. 179. Washington, D.C., June 1924.

A Dermanyssid, *Entonyssus rileyi*, sp. n., is recorded from the lung sac of a rattlesnake from Texas.

Fayet (M. A.). **Gale sarcoptique et gale démodécique concomitantes.**—*Rev. vét.*, lxxvi, no. 7, pp. 406–408. Toulouse, July 1924.

A case is recorded of the simultaneous occurrence of sarcoptic and demodectic mange in a dog, the former infection entirely masking the latter. This is not considered a unique case, but is rare.

Napier (L. E.) & Muir (E.). **Kala Azar. A Handbook for Students and Practitioners.**—8vo, viii+160 pp., 9 plates, 1 map. London, Humphrey Milford, Oxford Univ. Press, 1923. [Price 8*s.* 6*d.*] [Received 15th August 1924.]

This handbook is designed to give the general practitioner all the information that he needs concerning kala-azar in the course of his practice, and at the same time to supply most of the routine knowledge required in the laboratory. The information is given in a clear and concise manner, chapters being devoted to epidemiology, aetiology and laboratory technique, as well as to the more strictly clinical aspects of the subject. A bibliography of 54 references is added, and there is a short index.

In the chapter on aetiology the causal organism is discussed, the possible routes by which infection may be spread are clearly set out, and the arguments for and against each theory are given, the whole chapter forming a brief but suggestive review of the transmission problem. The question is dealt with in a purely judicial manner, without the expression of personal opinions. The insects discussed as coming under suspicion as vectors are *Cimex* [*hemiptera*], fleas, sandflies [*Phlebotomus*] and *Triatoma* (*Conorhinus*) *rubrofasciata*.

da Matta (A.). *Rhodnius pictipes* **Stål no** [in] **Amazonas.**—*Brazil-Medico*, xxxviii (2), no. 1, p. 8. Rio de Janeiro, 5th July 1924.

A Reduviid bug from Brazil, recently recorded as *Rhodnius prolixus*, Stål, has been found to be *R. pictipes*, Stål, a species not previously definitely known from that country.

Larrousse (F.). **Description de la femelle de** *Triatoma maxima* **(Uhler, 1894).**—*Ann. Parasit. hum. & comp.*, ii, no. 3, pp. 207–210, 2 figs. Paris, July 1924.

The female of *Triatoma maxima*, Uhler, is here described for the first time; it was taken in Lower California, Mexico, in August, at an altitude of about 1,300 feet. Uhler's description of the male is also quoted.

Leon (N.). **Action des ectoparasites sur les Culicides.**—*Ann. Parasit. hum. & comp.*, ii, no. 3, pp. 211–213, 2 figs. Paris, July 1924.

In attacks on mosquitos by *Culicoides*, infectious germs are sometimes inoculated into the puncture, or a fungous spore may alight on the wound and cause a tumour. One female of *Anopheles maculipennis* was observed suffering from an abdominal hernia at the point of a puncture made when the mosquito was empty and the proboscis of the midge could not reach the stomach. When later the mosquito became engorged, extrusion of part of the stomach through the puncture was the result.

Brumpt (E.). **Le** *Trypanosoma rhodesiense*: **faits et hypothéses concernant son individualité.**—*Ann. Parasit. hum. & comp.*, ii, no. 3, pp. 254–273, 3 figs. Paris, July 1924.

The characters and bionomics of *Trypanosoma rhodesiense* are discussed, the author maintaining the opinion that this trypanosome,

although very closely allied to *T. brucei* and *T. gambiense*, constitutes a valid species. He considers that Duke's theory involves admitting the identity of these three species [*R. A. E.*, B, x, 26 ; xi, 63 & 190], but he is of the opinion that the classification of trypanosomes should be based on their combined morphological and biological characters. The natural immunity of certain species of host from natural infection is a valuable point and constitutes, in the absence of any other, an excellent criterion for identifying certain species The author does not feel inclined to admit the possibility of rapid biological transformations of trypanosomes during the last few years in Africa. Moreover, the mechanical transmission of trypanosomes infecting man in Africa does not explain the seriousness of some epidemics, which depend, on the one hand, on certain factors that have been described in earlier writings as the " génie épidémique " and that have not yet been determined, and, on the other hand, on the lack of immunity in fresh populations subjected to infection.

An attempt has been made to explain certain obscure features in the epidemiology of sleeping sickness by experimenting with *T. inopinatum* and its natural vector, a leech, *Helobdella algira*. The strains used were an Algerian one, fatal to *Rana esculenta* and generally to *R. temporaria*, and a Portuguese one producing in the former frog chronic and long-lasting infection, and only with difficulty infecting the latter at all. Immunity experiments proved that the same species of parasite was used. Various tests were made to determine whether the variable virulence of the stocks of trypanosomes depended on the vector. A fresh lot of *Helobdella* were infected, some with the Algerian strain and some with the Portuguese one, and by feeding them on susceptible animals it was found that the strain was in no way modified. These experiments, moreover, were made in water, which eliminates certain factors the influence of which is unknown. The conclusions reached were that stocks of trypanosomes of variable virulence occur, although they may be found in animals of the same species, and that they are transmitted cyclically by the same host-vector under absolutely identical conditions. The determining causes of these variations are unknown. Further experiments prove that in regions where carriers of trypanosomes of variable virulence may be introduced, a stock will be established with a virulence equal to the most virulent of the trypanosomes imported.

No attempt has been made to demonstrate this fact in the case of *Glossina*, and the author's experiments with *Trypanosoma cruzi* and its natural or vicarious vectors (*Triatoma, Rhodnius*) have not been conclusive owing to the great difficulties to be surmounted. It has been shown, however, that in the leech, the weak Portuguese strain and the strong Algerian one can develop independently of each other. The mixture of these two stocks does not produce a strain of medium virulence ; it is always the Algerian or stronger strain that demonstrates its power by killing frogs bitten by leeches with mixed infection. Moreover, the previously infected leech had acquired no immunity against a fresh infection by homologous or heterologous strains. When a frog shows an experimental mixed infection with both the Algerian and Portuguese strains, fresh leeches placed on it, allowing for the simultaneous development of both strains, probably transmit both, but death follows as though the Algerian strain alone were present. *R. esculenta*, suffering from recent chronic infection produced by the Portuguese strain and bitten by *Helobdella* transmitting the Algerian

one, becomes super-infected, and succumbs under the action of the latter as though the first infection had only conferred a very slight immunity.

These experiments should be repeated with trypanosomes pathogenic to mammals, but the present study leads to the conclusion that it is most important to avoid movements of trypanosome-infected individuals originating from localities where sleeping sickness appears in serious forms, even when the form of infection is endemic, to other regions where the seriousness of the disease has relatively died down. As the receptivity of certain domestic animals has been proved experimentally, the same administrative measures regarding their movement to a distance should be taken. It seems possible that these domestic animals may have created endemic centres of *T. gambiense* or *T. rhodesiense* in the same way as man by becoming established in a new country and contaminating races not previously touched by the disease and therefore without any natural resistance due to selection, such as is observed in regions where the human and animal trypanosomes have existed for a long time.

Larrousse (F.). **Nouveau cas de myiase oculaire à** *Oestrus ovis*, **L., en France.**—*Ann. Parasit. hum. & comp.*, ii, no. 3, p. 274. Paris, July 1924.

A case is recorded of 7 larvae of *Cephalomyia* (*Oestrus*) *ovis*, L., being extracted from the eye of a person in charge of sheep in Indre (France). Similar cases have previously been noticed [*R. A. E.*, B, x, 54].

Gansser (A.). **Le Varon en Suisse : ses dommages et sa destruction.**—*Ann. agric. Suisse*, xxv, pt. 2, pp. 193–236, 1 pl., 23 figs. Bern, 1924.

This information on *Hypoderma bovis* and *H. lineatum* infesting cattle in Switzerland has been noticed from another source [*R. A. E.*, B, xii, 11].

Dampf (A.). **Zur Kenntnis der Estländischen Moorfauna (II. Beitrag).** [A Contribution to the Knowledge of the Moor Fauna of Esthonia. II.]—*Sitzungsber. Naturf.-Ges. Univ. Dorpat*, xxxi, no. 1–2, pp. 17–71, 10 figs. Dorpat, 1924.

This paper contains the following list of Simuliids by Dr. G. Enderlein : *Simulium* (*Cnetha*) *aureum*, Fries, *S.* (*C.*) *kerteszi*, Enderl. and *S. kerteszi* var. *melanobrachium* n., *S.* (*Wilhelmia*) *equinum*, L., *S.* (*Odagnia*) *ornatum*, Mg., *S.* (*Boopthora*) *sericatum*, Mg., and *S.* (*B.*) *argyreatum*, Mg.

Dr. R. Frey has identified the Tabanids, *Tabanus montanus*, Mg., and *Haematopota pluvialis*, L., and the Hippoboscids, *Hippobosca equina*, L., and *Ornithomyia avicularia*, L.

King (H. H.). **Entomological Section.**—*Sudan Govt. Sci. Res. Commit. Rept., 1923*, pp. 9–10. Khartoum [1924].

In connection with the entomological survey of the Sudan the following blood-sucking flies are added to the list : *Glossina fusca*, Wlk.,

G. fuscipleuris, Aust., *Chrysops funebris*, Aust., *Rhinomyza perpulchra*, Aust., *Tabanus besti*, Surc., *T. crocodilinus*, Aust., and *T. corax*, Lw.

KRÖBER (O.). **Die Tabaniden der Philippinen.** [Tabanids of the Philippines.]—*Arch. Naturgesch.*, Abt. A, xc, no. 1, pp. 1–27. Berlin, July 1924.

New Tabanids from the Philippine Islands are *Tabanus philippinensis* and *T. griseoscutellatus*. Keys are given to the species of *Chrysops* and *Tabanus* from these islands.

SCHUURMANS STEKHOVEN Jr. (J. H.). **The Blood-sucking Arthropods of the Dutch East Indian Archipelago. IV. The Tabanids from Buru. The Genera *Tabanus* and *Chrysops*.**—*Treubia*, v, no. 4, pp. 299–330, 4 figs., 3 pls. Buitenzorg, April 1924.

Hitherto *Tabanus flavipennis*, Ric., was the only Tabanid known from the island of Buru, Moluccas, but the following are now added : *Tabanus reducens*, Wlk., *T. succurvus*, Wlk., *T. brunneothorax*, sp. n., *Chrysops signifer*, Wlk., and *C. atrivittata*, sp. n.

STRAND (A. L.). **Cyanide for Bedbugs.**—*Montana Agric. Expt. Sta.*, Circ. 123, 7 pp., 3 figs. Bozeman, Mta., February 1924. [Received 29th July 1924.]

Fumigation with hydrocyanic acid gas being considered the most satisfactory method against bedbugs [*Cimex lectularius*, L.], details are given for its preparation and application, including the special precautions necessary in using it. The formula recommended is 1 oz. sodium cyanide, 2 fl. oz. sulphuric acid, and 3 fl. oz. water to every 100 cu. ft. of space.

WÜLKER (G.). **Nematodes.**—*Biol. Tiere Deutschlands*, Teil 8, pp. 1–64, 25 figs. Berlin, Borntraeger, 11th July 1924. Price 1*s.* 8*d.*

This section of a general treatise already noticed [*R. A. E.*, A, xi, 199], deals with the structure, life-history and distribution of Nematodes, special attention being paid to their infestation of plants and animals, both vertebrate and invertebrate.

FERRIS (G. F.). **A Note on some Hippoboscidae (Diptera, Pupipara).**—*Ent. News*, xxxv, no. 7, pp. 234–235. Philadelphia, Pa., July 1924.

Since the author published his description of *Ornithomyia strigilecula*, Ferris [*R. A. E.*, B, xi, 100], it has been found that the transverse comb of setae on the basal segment of the posterior tarsi is characteristic of the species of *Ornithoctona* and is absent in *Ornithomyia*. The fly in question should therefore be referred to *Ornithoctona*.

Ten species have in all been referred to the genus *Ornithoica*, Rond. Of these, however, *O. exilis*, Wlk., *O. vicina*, Wlk., *O. beccariina*, Rond., *O. pusilla*, Schiner, and *O. promiscua*, Ferris & Cole, have all been treated by various authors as synonyms of *O. confluenta*, Say. On this basis, *O. confluenta* becomes a species of practically cosmopolitan distribution, although it is not known from a wide range of hosts. The author considers these determinations unreliable. A single

individual from Borneo, which is probably *O. beccariina*, differs markedly from *O. promiscua*. *O. confluenta* is practically unrecognisable from the original description, and until it has been redescribed from authentic material it is considered that *O. promiscua* should be regarded as distinct from it.

Crumb (S. E.). U.S. Bur. Ent. **Odors attractive to Ovipositing Mosquitoes (Dipt. : Culicidae).**—*Ent. News*, xxxv, no. 7, pp. 242–243. Philadelphia, Pa., July 1924.

Experiments to determine the influence of odours emanating from water upon mosquitos with regard to their choice of oviposition sites have been made by means of earthenware jars of water containing various odorous substances. Old yeast infusion, stale urine, and, to a less degree, hydrogen sulphide and methane all proved attractive ; no egg-masses were obtained from water only or from indol, hay infusion, ethyl mercaptan, rich earth, skatol or carbon dioxide. The attractive principles are probably products of bacterial action, and the preferences are probably correlated with the food habits of the larvae. Adults bred from the egg-masses obtained in the jars were all *Culex pipiens*, L. It is hoped to discover an attractant sufficiently powerful to concentrate in a few receptacles a large proportion of mosquito oviposition in a locality, so that the eggs or larvae may be readily destroyed.

Haseman (L.) & Sullivan (K. C.). **An Investigation of the Malarial Mosquito Plague in Missouri.**—*Missouri Agric. Expt. Sta.*, Bull. 210, p. 48. Columbia, Mo., February 1924.

There are only two malarial mosquitos in Missouri, *Anopheles quadrimaculatus* and *A. punctipennis*, both of which are widely distributed.

Britton (W. E.). **Mosquitoes and Human Welfare.**—*Connecticut Agric. Expt. Sta.*, Bull. 256, pp. 294–303, 6 figs. New Haven, Conn., 1924.

A general account is given of mosquitos and their relation to health. The chief species in Connecticut are *Anopheles punctipennis*, *A. quadrimaculatus*, *Culex pipiens*, *Aëdes cantator* and *A. sollicitans* ; the usual anti-mosquito measures are briefly outlined.

Botsford (R. C.). **Mosquito Control Work. Season of 1923.**—*Connecticut Agric. Expt. Sta.*, Bull. 256, pp. 303–310, 2 pls. New Haven, Conn., 1924.

The anti-mosquito legislation passed in 1923 in Connecticut provides that the State will pay the expenses of maintaining the drainage of approved areas. The general conditions during 1923 are described, and a short account is given of the measures taken in various towns.

Howard (L. O.). **On Zoophilism with *Anopheles*—a Review.**—*Jl. Parasit.*, x, no. 4, pp. 191–198. Urbana, Ill., June 1924.

A bibliography of 21 titles is given of the literature reviewed, and the author points out the need for further studies on this question in the United States.

Binger (A.). **Ueber die heutigen Methoden der Vernichtung der Insekten in Wohnungen, Schiffen und Eisenbahnen.** [On Present Day Methods of Destroying Insects in Dwellings, Ships and Railways.]— *Arch. Schiffs- u. Trop.-Hyg.*, xxviii, no. 6, pp. 237–247. Leipzig, July 1924.

This is a brief review of the various methods now in use. A copious bibliography is given.

Martini (E.). **Ueber jugoslavische Anophelen mit besonderer Berücksichtigung der Frage der misanthropen Rassen.** [On Jugoslav Anophelines with particular Regard to the Question of misanthropic Races.]— *Arch. Schiffs- u. Trop.-Hyg.*, xxviii, no. 6, pp. 254–265. Leipzig, July 1924.

The following Anophelines are known from Jugo-Slavia : *Anopheles plumbeus* (*nigripes*), *A. bifurcatus*, *A. algeriensis*, *A. elutus*, *A. maculipennis*, *A. hyrcanus* (*sinensis*), and *A. superpictus*. A key to these is given.

The distribution of *A. plumbeus*, *A. bifurcatus* and *A. algeriensis* needs further study ; they do not seem to be plentiful enough to play an important part in the epidemiology of malaria. *A. maculipennis*, *A. elutus* and *A. superpictus* are important as carriers of malaria in view of their abundance, but, as has been already pointed out, *A. superpictus* predominates in Macedonia at the season when malignant tertian occurs and is chiefly responsible for its transmission, particularly as *A. maculipennis* is not numerous in August and September. This leads to the curious fact that severe malaria occurs in the hills, where *A. superpictus* abounds, and in the lowlands, the region of *A. maculipennis*, benign tertian fevers occur. In earlier investigations on the susceptibility of *A. superpictus* and *A. maculipennis*, individuals classed as the latter have included *A. elutus*, so that new investigations are necessary. If the preponderance of *A. elutus* in autumn is confirmed, the same relation between it and *A. maculipennis* will exist in the west as between *A. superpictus* and *A. maculipennis* in the south-east, *i.e.*, if *A. elutus* possesses an equal degree of susceptibility it will be more important than *A. maculipennis* in the transmission of malignant tertian.

As regards Roubaud's theory of misanthropic races and their separation on the number of maxillary teeth, the author has reached the following conclusions :— *A. elutus* tends to have less teeth than *A. maculipennis*. The number of teeth seems to depend on the warmth during development, for if both species occur in the same locality, such individuals as develop in warm water have less teeth than those that have developed in colder water. The number of teeth is therefore not a racial character, but a modification depending on climate. The summer generations of both species are smaller, on an average, than the spring ones, and it is probable that the smaller number of teeth is simply due to the smaller size.

As malaria is rarer in cooler regions, there is a general parallelism between the number of teeth in a given species and the decrease of malaria.

The author is doubtful of the specific identity of North American mosquitos of the *maculipennis* group with Central European ones, and thinks that *A. occidentalis* is probably a valid species.

Peryassu (A.). **Uma nova especie de mosquito do Brasil.** [A New Species of Mosquito from Brazil.]—*A Folha Medica*, iv, no. 1, p. 2. Rio de Janeiro, 1923. (Abstract in *Arch. Schiffs- u. Trop.-Hyg.*, xxviii, no. 6, p. 265. Leipzig, July 1924.)

Uranotaenia argenteopennis, sp. n., is described from Brazil. The larva is often mistaken for that of an Anopheline.

[Popov (P. P.).] **Попов (П. П.). Тропический Институт и тропическия болезни в С. С. Армении.** [The Tropical Institute and Tropical Diseases in Armenia.]—*Russ. Jl. Trop. Med.*, 1924, no. 3, pp. 3–6. Moscow, 1924.

Malaria is the most prevalent tropical disease in Armenia.

Anopheles hyrcanus, Pall. (*pseudopictus*, Grassi) is the commonest Anopheline in the river valleys, but at higher altitudes it is replaced by *A. maculipennis*, Mg. Another species closely resembling *A. lindesayi*, Giles, though not yet definitely identified, and also *A. plumbeus*, Hal., have been found, the latter being recorded for the first time. In the towns *A. bifurcatus*, L., was also occasionally found. The larvae of *A. maculipennis* and *A. superpictus*, Grassi, may occur in foul and stagnant water as has been found by previous workers in Anatolia.

Other blood-sucking Diptera recorded are *Culex pipiens*, L., *Phlebotomus papatasii*, Scop., *P. pernicious*, Newst., *P. rostrans*, Summers & Connal, and *Simulium reptans*, L.

[Lindtrop (G. T.).] **Линдтроп (Г. Т.). Белый малярийный комар—*Cellia* (*Anopheles*) *pulcherrima* Theob. в Азербейджане.** [The White Malaria Mosquito, *A. pulcherrimus*, in Azerbaijan.]—*Russ. Jl. Trop. Med.*, 1924, no. 3, pp. 38–40. Moscow, 1924.

A mosquito from Azerbaijan differs slightly from *Anopheles pulcherrimus*, Theo., recorded from Turkestan [*R. A. E.*, B, i, 193]. The varietal name *A.* (*Cellia*) *pulcherrimus* var. *atropotenae*, n., is suggested for it, and the characters distinguishing it from the typical form are given. The breeding places of this variety in Azerbaijan are similar to those recorded for *A. pulcherrimus* in Turkestan [*loc. cit.*].

[Tarnogradski (D. A.).] **Тарноградский (Д. А.). К распространению и биологии малярийного комара на Военно-Грузинской дороге.** [The Distribution and Biology of the Malaria Mosquito on the Georgian Military Road.]—*Russ. Jl. Trop. Med.*, 1924, nos. 2 & 3, pp. 50–52 & 41–45. Moscow, 1924.

The general topography of the country along the Georgian Military Road is described. Though the current of the two main rivers, Terek and Aragva, is much too fast for the breeding of Anophelines, there is an abundance of suitable breeding places in the form of lakes, pools, streams, etc. With a few exceptions Culicine and Anopheline larvae were always found in the same places, the former generally being more numerous. On the whole Anophelines require cleaner water than Culicines; they were also encountered at an altitude of about 6,600 ft., this being considerably higher than any previous record for Anophelines with the exception of Brumpt's similar record for Africa.

Two species of *Anopheles* occur, *A. maculipennis*, Mg., and *A. bifurcatus*, L., the former being far the more abundant. Only isolated

individuals of *A. maculipennis* were taken in human habitations, and these hardly ever contained blood, whereas engorged individuals were abundant in cowsheds and other outhouses near cattle. Numerous experiments were made by the author to induce the feeding of these mosquitos on himself, but without any success. These observations, combined with the scanty and scattered population and abundance of cattle and sheep, would indicate the presence of a zoophilic race, the existence of which is however contradicted by the prevalence of malaria among the indigenous population. The importance of a prolonged study of these conditions is pointed out.

GRASSI (B.). **Sulla trasmissione della malaria.** [On Malaria Transmission.]—*Atti R. Accad. Naz. Lincei*, Classe Sci. fis., matemat. e nat., xxxiii, no. 10, pp. 373–376. Rome, 18th May 1924.

It is suggested that malaria may be transmitted by Anophelines not only by the recognised indirect method but by the direct mechanical conveyance of infected blood by the bite itself. The author advanced this theory in the past and rejected it after experiments with negative results. As such negative results may have depended on the fact, now known, that there are four types of human blood, or on experimental conditions, it is proposed to investigate this question anew. It is certain that in some years there is a marked divergence between the small number of Anophelines present and the gravity of the malarial epidemic [*cf. R. A. E.*, B, xii, 94].

DE ALMEIDA (E.). **A transmissão de lepra pelo mosquito.** [The Transmission of Leprosy by Mosquitos.]—*A Folha Medica*, v, no. 14, p. 163. Rio de Janeiro, 16th July 1924.

A case that seems to support the theory of mosquito transmission of leprosy is that of a girl who had never associated or come in contact with a leper from another part of the country, who resided for about a year near her home, but yet developed the disease after the leper had left.

[PALESTINE.] **Proceedings of the 9th Meeting of the Antimalarial Advisory Commission, 22nd May 1924.**—20 pp., multigraph.

The investigations of this Commission have shown that August, September and October are the dangerous months in Palestine as regards malaria. Cresol proved a promising larvicide ; a very weak dilution in running water acts as a trap for mosquitos, in that it does not prevent oviposition but destroys the young larvae as they hatch from the egg. A dilution of 1 part cresol in 10 million parts water kills newly-hatched larvae in 12 hours, but has no effect on older larvae. At this dilution cresol is tasteless, and the method may therefore be applicable to drinking water cisterns, though it has not yet been tried. Observations on the flight of mosquitos have shown the average flight under usual conditions to be approximately $1\frac{1}{4}$ miles, but that this range of flight can be considerably increased. Particularly in the vicinity of marshes, where breeding is prolific, the flights extend over a much greater area, and the limits of the control zone can only be determined by actual observation. Under constant wind conditions, the extent of flight would seem to vary directly with the intensity of

breeding and inversely with the density of settlements in the vicinity of the breeding-place. Predictions with regard to a given place should be made only after these two variables have been definitely established by actual observation, and meantime the standard distance for routine anti-malarial measures should not be less than 1½ miles.

Hendriks (J. A.). **Uit de Malaria-epidemiologie.** [Notes on the Epidemiology of Malaria.]—*Geneesk. Tijdschr. Ned.-Indië*, lxiv, no. 3, pp. 353–402. Batavia, 1924.

This paper deals with the various forms of malaria occurring in the Dutch East Indies by describing actual epidemics, the various conditions of locality, climate, Anopheline fauna, spleen-indices, etc., being recorded in each case. The data relating to the occurence of Anophelines have already been noticed from other sources.

Walch (E. W.). **Over de Trombiculae, welke de Pseudotyphus overbrengen, en na verwante mijten uit Deli, (2e mededeeling).** [On Species of *Trombicula* that carry Pseudotyphus, and on closely-related Mites from Deli. Second Communication.]—*Geneesk. Tijdschr. Ned.-Indië*, lxiv, no. 3, pp. 499–529, 2 pls. Batavia, 1924.

Trombicula deliensis [*R. A. E.*, B, xi, 134] has been proved capable of carrying pseudotyphus. *T. schüffneri* appears to be able to infect man, and *T. oudemansi* has been taken from man. The nymphs of these three mites are described in detail and figured, tables being given for comparing the differences between them. Two new species, *T. keukenschrijveri* and *T. rara*, are described and figured. Both were taken from man.

Duke (H. L.). **Further Observations on the Effects of Direct Transmission on Trypanosomes.**—*Parasitology*, xvi, no. 3, pp. 251–254. Cambridge, July 1924.

This paper presents another instalment of experiments on the effects of prolonged direct transmission upon trypanosome strains in the laboratory [*R. A. E.*, B, xi, 190].

The author's conclusions are as follows :—By November 1922, the antelope strain had been maintained at the Entebbe Laboratory by direct transmission through 29 passages over a period of 27 months. During this period the virulence of the strain in laboratory animals had increased somewhat, and the power of cyclical development in *Glossina palpalis* has been seriously impaired, though not completely lost. From November 1922 to December 1923 the strain had undergone 21 more passages by direct transmission. The virulence had been considerably enhanced, and the power to develop in the tsetse had been lost. Whereas, when first isolated from the antelope on Damba Island, posterior-nuclear forms were common in guinea-pigs and dogs inoculated with the antelope strain, at the time of writing such forms are of exceedingly rare occurrence ; indeed, in their typical form, they seem to have quite disappeared. The behaviour of the antelope strain under prolonged direct transmission is thus essentially the same as that previously shown by the direct transmission strain, under similar conditions of maintenance. It is at present impossible to say whether the loss by the trypanosome of the power to develop

in the tsetse is intimately associated with the disappearance of the phenomenon of posterior and anterior displacement of the nucleus. It is hoped shortly to commence experiments bearing on this point.

CAMERON (A. E.). *Sarcoptes* **of Cattle.**—*Parasitology*, xvi, no. 3, pp. 255–265, 6 figs. Cambridge, July 1924.

Descriptions are given of the stages of *Sarcoptes scabiei bovis*, taken from a young bull at Alberta, and they are compared with those from the horse [*S. scabiei equi*], described by Buxton [*R. A. E.*, B, ix, 148].

PURI (I. M.). **Studies of the Anatomy of** *Cimex lectularius*, **L. ii. The Stink Organs.**—*Parasitology*, xvi, no. 3, pp. 269–278, 6 figs. Cambridge, July 1924.

The structure, development and position of the stink-organs of *Cimex lectularius*, L., in both the adult and larval stages are described. The function of these organs is defensive and in the adult perhaps also sexual.

KEILIN (D.). **On a Case of Intestinal Myiasis in Man produced by the Larvae of a Sarcophagine Fly.**—*Parasitology*, xvi, no. 3, pp. 318–320, 2 figs. Cambridge, July 1924.

Sarcophagid larvae in the first larval stage are described that were obtained from a case of intestinal myiasis in Nairobi. Several cases of intestinal myiasis due to such larvae have been recorded by various authors, but only in a few did the larvae succeed in reaching their full size, so as to be ready to pupate after evacuation. Two of the cases show, however, that the larvae of at least one species, *Sarcophaga haemorrhoidalis*, find in the alimentary tract of man conditions favourable for feeding and growth. They do not seem to live as parasites, but probably feed upon partly digested and decomposed food in the intestine. This medium is naturally devoid of or very poor in free oxygen, although the respiratory system of the larvae is highly specialised for the aerobic mode of living.

EWING (H. E.). U.S. Bur. Ent. **Notes on the Taxonomy and Natural Relationships of Fleas, with Descriptions of four new Species.**—*Parasitology*, xvi, no. 3, pp. 341–354, 1 pl., 1 fig. Cambridge, July 1924.

During re-arrangement of the collection of fleas in the United States National Museum, four new species were found and are described as *Hoplopsyllus foxi*, taken from *Lepus bachmani* in California; *Ceratophyllus javanicus*, from skunk in Java; *Pygiopsylla celebensis*, from *Sciurus evidens* in Celebes; and *P. sciuri*, from *Sciurus atricapillus* in Borneo.

The poultry-infesting species of *Ceratophyllus* in North America are *C. gallinae*, Schr., the common fowl flea of Europe; *C. niger*, Fox, and *C. gibsoni*, Fox. A key for the differentiation of these species is given.

The genus *Odontopsyllus* is discussed, and a key shows the relationships of the genera of the *Neopsylla* group. The question of the natural relationships and origin of fleas is reviewed.

Blacklock (B.) & Thompson (M. G.). **Rat-fleas in Freetown, Sierra Leone.**—*Ann. Trop. Med. & Parasit.*, xviii, no. 2, pp. 135–137. Liverpool, 2nd August 1924.

Of 657 fleas found on 100 rats at Freetown, 419 were *Xenopsylla brasiliensis*, Baker, 235 *X. cheopis*, Roths., and 3 *Ctenocephalus canis*, Dugès. It is not possible to say whether *X. brasiliensis* is capable of remaining alive during transport on ships to England, and its power as a plague-transmitting flea is also unknown. There is, however, a sufficiently large percentage of *X. cheopis* present in Freetown to carry plague in epidemic form should the disease be imported. Owing to the extensive area capable of providing natural shelter for rats, large numbers would survive any ordinary efforts at reduction, but the absence of a deep-water wharf has probably been the chief protection in the past against the introduction of plague from other coastal regions.

Potts (W. H.). **A New Variety of *Glossina schwetzi*, Newstead & Evans, from the Belgian Congo.**—*Ann. Trop. Med. & Parasit.*, xviii, no. 2, pp. 205–206, 1 fig. Liverpool, 2nd August 1924.

Glossina schwetzi var. *disjuncta*, n., is described from the Belgian Congo. The description is based on the male genitalia of a single individual.

Hett (M. L.). **On the Family Linguatulidae.**—*Proc. Zool. Soc. London*, 1924, pt. 1, pp. 107–159, 13 figs. London, March 1924.

A short general account is given of the anatomy and life-history of the family Linguatulidae, based on all accessible important works of previous writers, together with the results of a number of independent observations.

Walsh (G. B.). **The Passage of Apterous Insect Parasites, etc., from Host to Host.**—*Ent. Mo. Mag.*, lx, pp. 143–148. London, June-July 1924.

The method by which various apterous parasites pass from one host to another is briefly discussed.

Veitch (R.) & Greenwood (W.). **The Food Plants or Hosts of some Fijian Insects. Part ii.**—*Proc. Linn. Soc. N.S.W.*, xlix, pt. 2, no. 196, pp. 153–161. Sydney, 2nd July 1924.

Since the publication of the first part of this paper [*R. A. E.*, B, x, 76], additional records have been obtained, including the Culicid, *Rachionotomyia purpurata*, Edw., attacking man, and *Musca domestica*, L., the larvae of which feed on rotten seeds of *Vigna catjang*.

Becker (T.). **Dolichopodidae von Formosa.**—*Zool. Meded. R. Mus. Nat. Hist. Leiden*, viii, no. 2, pp. 120–131. Leiden, 31st July 1924.

This supplement to a monograph already noticed [*R. A. E.*, B, xi, 42], deals with the Dolichopodidae collected in Formosa by Sauter. In all, 36 species are dealt with, including 16 new ones and 1 new genus.

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Beller (—). *Dermanyssus avium* **als Ursache von Massensterben beim Hausgeflügel.** [*D. gallinae* as the Cause of the Death of large Numbers of Poultry.]—*Berliner tierärztl. Wochenschr.*, 1924, p. 261. (Abstract in *Deutsche tierärztl. Wochenschr.*, xxxii, no. 32, p. 466. Hanover, 9th August 1924.)

Prolonged observations prove *Dermanyssus gallinae* (*avium*) to be capable of killing young chickens in large numbers. As this mite only occurs on the birds by night, their deaths are generally ascribed to poisoning. With a lens the mites can be found inside the mouth and crop, the bird having attempted to free itself with its beak. The trouble occurs in summer, owing to the increase of the mites at that time of the year. It is very difficult to disinfect wooden shelters. The birds may be housed elsewhere or fumigation with sulphurous anhydride may be carried out, though this does not destroy all the mites.

Sharif (M.). **The External Morphology and Bionomics of the commonest Indian Tick** (*Hyalomma aegyptium*).—*Agric. Res. Inst., Pusa*, Bull. 152, 23 pp., 5 pls. Calcutta, 1924.

There are apparently two varieties of *Hyalomma aegyptium* in the Punjab, the smaller one being common on horses, sheep, goats and cattle, and the larger being found mostly on camels. Detailed and comparative accounts are given of the various stages.

When fully gorged the female drops from the host and crawls into a convenient crevice near the ground, where the eggs are laid after a rest period of about 9 to 12 days. The number of eggs laid by each individual varies from 6,000 to 8,000, the oviposition period lasting about 20 days. The maximum number laid in one day was 800. The female dies before the larvae hatch, which is in from 23 to 26 days, the time varying according to the temperature. After about 20 days rest, they crawl out in search of a host and have been found on the ears and other soft parts of the horse, calf, camel and buffalo, though their occurrence on calves has been denied by Patton and Cragg. During the winter, especially from November to the middle of February, the larvae disappear from these hosts. They feed for from 3 to 5 days, after which they drop to the ground and shelter in a crevice. The colour of the larvae depends on the colour of the food, and they may be scarlet, red or blue, whilst those fed on pus are white. The nymphs emerge after 5 to 7 days and are ready to attach themselves to a host after a rest period of 5 or 6 days. They feed for 5 to 7 days, leave the host and climb into a crevice, the adults emerging after 9 to 15 days' rest. After another 7 or 8 days they are ready to re-attach themselves to a host.

Strickland (C.). **On Spider-Lick, a Dermatozoosis.**—*Indian Med. Gaz.*, lix, no. 8, pp. 385–387, 5 figs. Calcutta, August 1924.

Spider-lick is one of the minor, though common and troublesome, affections of the skin, occurring at different periods of the year in India. It is caused by a Staphylinid beetle, *Paederus fuscipes*. General evidence shows that the beetles are not prevalent during the rains or in the coldest months. Natives in tea gardens are less attacked than Europeans, apparently because they do not have such bright lights in their homes.

Takahashi (R.). **Life-history of Blattidae.**—*Dobutsugaku Zasshi* [*Zool. Mag.*], xxxvi, no. 427, pp. 215–230. Tokyo, May 1924.

These observations were chiefly made on *Periplaneta americana*, L., and *P. australasiae*, F., which are common in dwelling houses in Formosa. They devour human excreta as well as other matter, and can live from 15 to 68 days without taking food. All stages may be found at any season throughout the year. *P. americana* can produce parthenogenetically a few, usually about three, egg-capsules during life; the young from these do not normally hatch, and those that do usually fail to mature. Each egg-capsule contains an average of 16 eggs in the case of *P. americana* and 26 in that of *P. australasiae*. *P. americana* usually begins to produce egg-capsules about 10 days after the last moult. They are carried about for from 9 hours to 3 days, generally 20 hours. Each female produces 25–71 capsules, on an average 51, during life; in warm seasons (from April to September) she lays one every 3–7 days, but in cold weather only a few are produced. The incubation period lasts 19–70 days. The time taken to reach the adult stage varies greatly in length, even with individuals hatched from the same capsule and bred in the same cage, lasting, in the case of *P. americana*, 8–19 months, during which period 6 or 7 moults take place, while *P. australasiae* moults 9 times. The adult female of *P. americana* lives 13–25 months, with 17 months as an average, the male living from 6 to 14 months.

In Formosa a large spider eats the cockroaches, and *Evania appendigaster*, L., and *Tetrastichus hagenowi*, Ratz., are parasitic on the egg-capsules. In the author's opinion, the habit of living indoors observed among Blattids and certain other Orthoptera depends largely on the positively thermotropic character of the insects. *Periplaneta* spp. are sometimes used by the natives as medicine.

Okamoto (H.). **The Insect Fauna of Quelpart Island (Saishiu-to).**—*Bull. Agric. Expt. Sta. Govt. Gen. Chosen*, i, no. 2, pp. i-iv & 47–233, 4 pls., 1 map. Suigen, Korea, March 1924.

Among the species recorded in this survey of the insect fauna of Quelpart Island and the adjacent country are *Hippobosca capensis*, Olfers, infesting dogs; *Musca domestica*, L., *M. autumnalis*, DeG. (*corvina*, F.), and *Lucilia caesar*, L., all of which are common in Korea; and the Tabanids, *Tabanus chrysurus*, Lw., and *T. mandarinus*, Schin., said to be carriers of infectious anaemia of horses in Korea and Japan, *Haematopota tristis*, Bigot, which may be a carrier of infectious diseases in horses, and *Chrysops suavis*, Lw., which also attacks horses and cattle, but is not considered so dangerous as *H. tristis*.

Senior-White (R.). **A Revision of the Sub-family Sarcophaginae in the Oriental Region.**—*Rec. Ind. Mus.*, xxvi, pt. 3, pp. 193–283, 12 pls. Calcutta, May 1924. [Received 27th August 1924.]

This revision is intended to facilitate future study of the subfamily Sarcophaginae and especially the genus *Sarcophaga*. The external characters used in the classification are described and set out in a table, and a number of new species are described.

Böttcher's table of the Palaearctic species of *Sarcophaga*, re-cast in the form of a dichotomous key, is given as an appendix.

Webb (J. L.) & Wells (R. W.). **Horse-flies: Biologies and Relation to Western Agriculture.**—*U.S. Dept. Agric.*, Dept. Bull. 1218, 36 pp., 18 figs., 4 pls. Washington, D.C., 21st July 1924.

The country under discussion is the Antelope Valley, lying partly in Nevada and partly in California; it is 23 miles long and from 2 to 5 miles wide, with an altitude in the middle of about 5,400 ft. The Tabanids of chief economic importance are *Tabanus punctifer*, O.S., and *T. phaenops*, O.S., other species found being *T. insuetus*, O.S., *T. intensivus*, Towns., *T. productus*, Hine, *Chrysops coloradensis*, Big., *C. discalis*, Will., *C. proclivus*, O.S., and *C. surdus*, O.S.

The early stages, life-history, and habits of *T. punctifer* and *T. phaenops* are described in detail, as well as the method of rearing. The mature larva of *T. punctifer* is described by A. G. Böving, and *T. monoensis*, sp.n., reared from larvae collected in the mud, by J. S. Hine.

Nearly all the egg-masses of *T. punctifer* were parasitised by the Hymenopteron, *Prophanurus emersoni*, Gir., which was also reared from *T. phaenops* in captivity, though the egg-masses of the latter were never found infested by any parasite in nature. This parasite is, however, an important factor in the control of *T. punctifer*. Predators include *Bembex primaaestate*, Johnson & Rohwer, and birds.

The usual protective measures for horses are briefly described. Poison baits were tested but found unpractical. It is believed that proper drainage of the country will not only improve its agricultural value but also reduce the breeding-places of Tabanids.

Bezzi (M.). **The Bombyliidae of the Ethiopian Region, based on Material in the British Museum (Natural History).**—8vo, viii+390 pp., 46 figs. London, Brit. Mus. (Nat. Hist.), 1924.

This useful monograph contains a catalogue of the Ethiopian species of Bombyliidae at present known, and gives a general survey of the family, with notes on classification and geographical distribution. Keys are included to the groups, subfamilies and genera, with many keys to the species of the genera dealt with, and many new species are described. The importance of this family from a medical point of view lies in the fact that some members of the genus *Thyridanthrax*, such as *T. abruptus*, Lw., and *T.* (*Villa*) *lloydi*, Aust., are parasitic on *Glossina*.

Guillet (—). **Fièvre récurrente à tiques à Brazzaville.**—*Ann. Méd. & Pharm. colon.*, xxii, no. 1, pp. 77–81. Paris, January-April 1924. [Received 1st September 1924.]

Native troops camped at Brazzaville, and newly arrived from the upper Congo, were found to be attacked by relapsing fever. Investigation revealed the presence of the tick, *Ornithodorus moubata*.

du Toit (P. J.). **Sheep Scab: The Infectivity of Kraals.**—*9th & 10th Repts. Dir. Vet. Educ. & Res., Union S. Africa 1923*, pp. 223–229. Pretoria, 1924.

As previous experiments in this connection [*R.A.E.*, B, iv, 184] were not considered to be entirely convincing, further tests have been made that are held to have proved conclusively that a sheep kraal infested with the causal agent of sheep scab [*Psoroptes communis* var. *ovis*], if kept free from sheep for 17 days, will no longer be able to infect

sheep. It was also found that an infested kraal was unable to re-infest a number of sheep that had been suffering from scab, had then been dipped twice at 9 days' interval, and immediately returned to the infested kraal. The policy of dipping is therefore vindicated.

FULLER (C.). **Tsetse in the Transvaal and surrounding Territories : An Historical Review.**—*9th & 10th Repts. Dir. Vet. Educ. & Res., Union S. Africa 1923*, pp. 317–376, 7 pls., 9 maps. Pretoria, 1924.

This review of the occurrence of *Glossina* in the Transvaal has been noticed from another source [*R. A. E.*, B, xii, 71].

METTAM (R. W. M.). **Snotsiekte in Cattle.**—*9th & 10th Repts. Dir. Vet. Educ. & Res., Union S. Africa 1923*, pp. 395–432, 1 pl. Pretoria, 1924.

Snotsiekte (mucous sickness) is an acute febrile specific disease of cattle, which is almost invariably fatal, and which is caused by contact with the black wildebeest. The disease, which seems to have been more frequent in the earlier days of colonisation, only appears sporadically at the present time, and generally after some enforced contact with wildebeest. Cattle are the only susceptible animals, and the percentage of wildebeest virus-carriers varies in different localities and under different conditions, this animal never showing symptoms of the disease. Experimentally, the disease can only be produced in cattle by the intravenous or subcutaneous inoculation of blood. Under natural conditions, the incubation period seems to be about a month. The vector is not definitely known, but is apparently an ectoparasite of the wildebeest that can also transmit the disease from cattle to cattle. Ticks may be virtually excluded ; they were not common on the farm under consideration, and, moreover, if the disease were tick-borne, it would be more prevalent. Two species of lice are found on wildebeest, *Linognathus* sp. and a non-bloodsucking species, *Trichodectes harrisoni*, Cummings. The former seems likely to be the vector, as it is a blood-sucker and somewhat rare ; and is closely associated with its host, while being readily capable of changing hosts when in close contact with other wildebeest or cattle Experiments with it were inconclusive. Cattle lice (*Haematopinus eurysternus*, Nitz., and *Linognathus vituli*, L.) did not transmit the disease.

VAN ZYL (J. P.). **Note on the Composition of various Samples of Arsenite of Soda.**—*9th & 10th Repts. Dir. Vet. Educ. & Res., Union S. Africa 1923*, pp. 777–780. Pretoria, 1924.

Sodium arsenite is the recognised form of arsenic for dipping purposes, being easily soluble in water. Several compounds between white arsenic and soda (and water) are chemically possible, so that sodium arsenites having a widely different arsenic-content may appear in the commercial market. In South Africa it is usual to specify " 80 per cent. arsenite " for dips, *i.e.*, a compound containing 80 per cent. arsenic (As_2O_3) should be used and the formula for a given dip is based on this content. In a number of proprietary brands tested, however, the arsenic content varied considerably and greater uniformity should

be demanded, so that at least 78 per cent. arsenic should be present when the compound is dissolved in hot water. The firms supplying the material are also advised to guarantee a soda content of about 15 per cent. Examples of suitable and unsuitable arsenites on the South African market are given.

VAN ZYL (J. P.). **On the Determination of Arsenic, chiefly in Dip-washes.**—*9th & 10th Repts. Dir. Vet. Educ. & Res., Union S. Africa 1923*, pp. 783–795. Pretoria, 1924.

Descriptions and comparisons of various methods for analysing arsenical dips are given.

VAN ZYL (J. P.). **Oxidation in Arsenical Dipping Tanks.**—*9th & 10th Repts. Dir. Vet. Educ. & Res., Union S. Africa 1923*, pp. 799–808, 11 charts. Pretoria, 1924.

The examination of a large number of samples of sheep dip taken from field tanks, together with the observations of the author and many other workers, seem to justify the conclusion that under field conditions the concentration of the phenolic adjuvants in tanks containing phenolic proprietary dips usually becomes adjusted (by decomposition) more or less at a concentration still inimical to the development of the reducing organisms, but allowing of a certain amount of activity on the part of the oxidising bacteria. Further study of the question of bacterial oxidation is being planned.

Departmental Activities.—*Jl. Dept. Agric. Union S. Africa*, ix, no. 2, pp. 102–103. Pretoria, August 1924.

The paralysis tick [? *Ixodes* sp.] is a three-host tick, living on hares, rats and other small rodents in its larval and nymphal stages, and on sheep, goats, cattle, horses, dogs, jackals and antelope in its adult stage. It is recommended that all sheep be removed from the mountains to the flats from April to June, when the tick is prevalent [*cf. R. A. E.*, B, xi, 157]. If there are no flats, the stock should be kept on the slopes that do not get the early morning sun during the tick season.

It has been found in practice that the brown paper cover of the sheep-maggot fly trap [*R. A. E.*, B, xii, 19] is often broken by animals while the trap is in use, or it is soaked by rain and the flies escape. Instead of this paper an ordinary treacle tin lid may be used, the hole in the trap being cut so that the lid fits tightly in it.

BEDFORD (G. A. H.). **The External Parasites of Poultry, with Measures for their Control.**—*Jl. Dept. Agric. Union S. Africa*, ix, no. 2, pp. 123–140, 11 figs. Pretoria, August 1924.

An account is given of the external parasites found on poultry in South Africa, with their bionomics and the most satisfactory remedial or preventive measures.

The species concerned are the ticks, *Argas persicus*, Oken (fowl tick), *Ornithodorus moubata*, Murray (both of which transmit spirochaetosis of fowls), *O. savignyi*, Aud., *Hyalomma impressum*, Neum. (bont-leg tick), and *Amblyomma hebraeum*, Koch (bont tick); the mites, *Dermanyssus gallinae*, DeG., *Cnemidocoptes mutans*, Robin (causing

scaly leg), and *C. laevis* var. *gallinae*, Raill. (causing depluming itch); the bird lice, *Menopon biseriatum*, Piag., found on fowls and turkeys; *M. gallinae*, L., *M. numidae*, Giebel, *Goniodes dissimilis*, Nitz., *Goniocotes gigas*, Tasch. (large fowl louse), *G. gallinae*, Retz. (*hologaster*, Nitz.) (fluff louse), *Lipeurus heterographus*, Nitz., and *L. caponis*, L., on fowls; *Goniodes meleagridis*, L., and *Lipeurus gallipavonis*, Geoff., on turkeys; and *Menopon africanum*, Kellogg & Paine, *Anatoecus* (*Docrophorus*) *dentatus*, Scop., and *Esthiopterum crassicorne*, Scop., on ducks; and the fleas, *Echidnophaga gallinacea*, Westw., and *Xenopsylla cheopis*, Rothsch. Mosquitos and sandflies are also troublesome, as is the Hippoboscid, *Lynchia maura*, Bigot.

Collins (E.). **Nagana in Northern Zululand.**—*S. Afr. Jl. Nat. Hist.*, iv, no. 4, pp. 260–268. Pretoria, March 1924.

The occurrence of trypanosomiasis of cattle in Northern Zululand and the general topography of the country are briefly discussed. The author is of opinion that the areas infested with *Glossina* are larger than has been previously stated.

Schwetz (J.). **Compte rendu du travail de la Mission médicale anti-trypanosomique du Kwango-Kasai (1920-1923).**—*Ann. Soc. belge Méd. trop.*, iv, no. 1, pp. 1–137, 5 maps, 7 pls. Brussels, July 1924.

Since the publication of an earlier report [*R. A. E.*, B, x, 157], the activities of the medical mission have been extended to the region of Kasai as well as Kwango, the whole area surveyed containing a population of 550,000 natives. The situation with regard to trypanosomiasis in the various districts is discussed, and the measures taken against the disease are explained. An appendix deals with the general distribution of *Glossina* in the Kwango district. The three species occurring are *G. palpalis*, the most important and widespread species; *G. tabaniformis*, confined to the basin of the Kwilu river and especially the neighbourhood of Kikwit; and *G. schwetzi*, found only on the banks of the Kwango.

Young (T. C. Mc.). **Fourteen Years' Experience with Kala-azar Work in Assam.**—*Trans. R. Soc. Trop. Med. & Hyg.*, xviii, no. 3, pp. 81–107, 6 figs, 2 maps. London, August 1924.

This paper deals chiefly with the epidemiology of kala-azar and the preventive measures adopted against it in Assam, a brief chapter being also devoted to the discussion of the possible transmission of the disease. The outstanding feature in this connection appears to be the "site infection." It is suggested that perhaps the solution of the problem of transmission may be found in an explanation that combines gross faecal pollution of the site and a life-history of the parasite in some coprophagic or coprozoic vector, or, at any rate, in the conditions that attend life in an unhygienic environment.

In the discussion following this paper, Dr. C. M. Wenyon stated that *Leishmania* have been found in the intestinal mucosa of kala-azar cases, and from the appearance of the tissues, must escape into the intestine. There is no evidence of infection in man as a result of feeding on infected material, but certain lizards, feeding on insects, harbour flagellates resembling the cultural form of *Leishmania* in

the intestine, blood, etc. The blood infection is probably due to invasion from the intestinal tract. He also suggested the possibility of insect transmission as the result of insect excreta containing the parasite being deposited on the human skin and subsequently inoculated by scratching or ingested by contamination of the mouth; and reviewed the types of insects harbouring flagellates and the ways by which infection may be acquired by them, including that of feeding on infected material of various kinds either in the adult or larval stage. Major E. E. Austen suggested that the slow dissemination, seasonal prevalence and local occurrence of the disease in India, may possibly be explained through the agency of cockroaches, which conceivably might infect man either directly by contaminating food, or indirectly by first being swallowed by lizards, and then in some form reaching human food in the reptiles' dejecta. The rare occurrence of the disease in children under a year old also points to the possibility of these insects being concerned to the exclusion of blood-sucking ones.

Duke (H. L.). [**Note on the Trypanosome Infections of Tsetse-flies in Northern Nigeria.**]—*Trans. R. Soc. Trop. Med. & Hyg.*, xviii, no. 3, pp. 142–144. London, August 1924.

The author (in a letter to the Editor) makes some strictures on the recent work of Lloyd and Johnson on this subject [*R.A.E.*, B, xii, 85]. He considers that in this and their earlier report [*R.A.E.*, B, xi, 117] there is some confusion as to whether the developmental cycle of the *Trypanosoma brucei-gambiense* group may comprise a stage where the flagellates are established in the proboscis of *Glossina*. The point is important, as, if such a stage really occurs, it is possible that, under certain circumstances, difficulty would arise in distinguishing between the *congolense* and the *brucei-gambiense* groups in the fly. In those groups of trypanosomes the development of which includes a preliminary non-infective stage in the gut of the fly, the parasite is not transmissible until it has occupied the " anterior station " appropriate to the group, *i.e.*, either proboscis or salivary glands. It is in this " anterior station " that the final stages of development take place, resulting in the production of forms infective to any susceptible mammals on which the fly may feed, and this final stage is characterised by the presence of fixed flagellates, either in the proboscis or in the salivary glands.

The methods of dissection employed are also criticised, and the technique employed in Uganda is described.

An interesting point emerging from Lloyd and Johnson's study of proboscis infections is that the hypopharynx appears to be the site of establishment of the infective forms. This suggests an explanation of the inability of certain flies, proved by subsequent dissection to have a heavy proboscis infection, to transmit *T. congolense* to presumably susceptible animals upon which the flies have undoubtedly fed.

Lloyd (L.), Johnson (W. B.), Young (W. A.) & Morrison (H.). **Second Report of the Tsetse-fly Investigation in the Northern Provinces of Nigeria.**—*Bull. Ent. Res.*, xv, pt. 1, pp. 1–27, 1 map, 7 figs. London, August 1924.

This is the second report on this subject [*R. A.E.*, B, xi, 117], the following being the authors' summary :—This report contains a record of the trypanosome infections, food and breeding of *Glossina morsitans*

and *G. tachinoides* obtained by examining the flies at various foci over a period of fourteen months. It confirms the fact that the breeding of both species is practically confined to the dry season and follows a period of increased food-supply. *G. tachinoides* is well fed through the rains, except in one month of flood, and starts breeding as soon as the rains cease, owing to its habit of feeding on reptiles. *G. morsitans* starts free breeding about six weeks later, as its increased food supply is due to the ungulates becoming more available. *G. morsitans* does not feed on reptiles, but in times of hunger draws a proportion of its food from birds, the largest proportion recorded being 17 per cent. in one month at one focus. It draws the bulk of its food in this locality from small antelope, large game being scarce. *G. tachinoides* is much less specialised in its diet, and in the wet season nearly one-fifth of its food was drawn from a group of animals that included man, monkey and dog. The infection of the flies with *Trypanosoma vivax* and *T. congolense* bears a close relation to the amount of blood obtained from antelope, and consequently *G. morsitans* is in general nearly four times as heavily infected as *G. tachinoides*. Infections with *T. brucei* and *T. gambiense* are scarce in this locality. Trypanosome infection rises just before the main breeding-season in *G. morsitans* in all localities and in *G. tachinoides* in places where the fly is largely a mammal feeder. The proportional infection in general falls in the season of most rapid breeding, owing to masking of the actual rise by the number of young flies examined. It rises rapidly when breeding ceases. The total infection is reduced when fly food is hard to obtain, in the time of long grass and flood, owing to *T. vivax* infections dying out when the flies are starved. It is shown that in some cases *T. grayi* may be obtained by *G. tachinoides* when it feeds on *Varanus*, and a somewhat similar infection in the laboratory may be obtained by feeding the flies on toads. There is just an indication that postponement of grass-burning may interfere with the free breeding of *G. morsitans* and in some cases with that of *G. tachinoides*. This possibility is to be tested. The experiment of excluding game and pig from one of the dry season foci of the flies by means of fencing will be carried out.

Marshall (J. F.). **An Improved Form of Apparatus for "Low Power" Insect Photomicrography.**—*Bull. Ent. Res.*, xv, pt. 1, pp. 49–50, 1 pl. London, August 1924.

The apparatus described and illustrated has been devised for photographing mosquitos by the method generally known as "low power photomicrography," a long extension camera fitted with a short focus photographic lens being employed.

Macfie (J. W. S.). **On some Egyptian Ceratopogoninae.**—*Bull. Ent. Res.*, xv, pt. 1, pp. 61–67, 2 figs. London, August 1924.

Among a number of Ceratopogonines collected at light on a voyage on the Nile between Cairo and Assuan, the following are described as new :—*Forcipomyia egypti*, *F. nilotheres*, *Atrichopogon callipotami*, and *Culicoides distinctipennis*, Aust. var. *egypti* n. A female that is apparently that of *Atrichopogon atriscapula*, Kieff., and the female of *Neoceratopogon melanostictus*, I. & M., are described, the latter species having been previously described from one male from the Gold Coast. The genus *Thysanognathus* (*Prionognathus*), erected by Ingram & Macfie [*R. A. E.*, B, ix, 76 ; x, 233], must apparently be regarded as synonymous with *Neoceratopogon*, Malloch.

Glaser (R. W.). **Rearing Flies for Experimental Purposes with Biological Notes.**— *Jl. Econ. Ent.*, xvii, no. 4, pp. 486–496, 2 pls. Geneva, N.Y., August 1924.

The following is the author's abstract of this paper: The house-fly (*Musca domestica*, L.), the biting stable-fly (*Stomoxys calcitrans*, L.), and the cattle horn-fly (*Lyperosia irritans*, L.) were used extensively in studies on the transmission of micro-organisms by these insects. During the course of the work, simple, inexpensive and effective methods have been evolved for the rearing and handling of large numbers of flies. Special emphasis is placed on a type of breeding-jar, on adult fly foods, on temperature, and on humidity. It was found that the last three have an important bearing on longevity and reproduction. To keep adult house-flies alive long enough to obtain the full development of their ovaries and testes it is necessary to feed them on sugar or assimilable starch, together with a solution of proteins or products of protein hydrolysis. In regard to the food for adult *Stomoxys*, the use of defibrinated cow or horse blood warmed to a temperature of 35–37° C. [95–98·6° F.] proved to be satisfactory. This procedure facilitates the omission of living higher animals as a source of blood for the flies. A number of minor biological and life-history observations are included in the article. The article is written for investigators who use flies for disease, genetic, physiological or other biological researches.

de Ong (E. R.) & White (L. T. W.). **Further Studies of Derris as an Insecticide.**— *Jl. Econ. Ent.*, xvii, no. 4, pp. 499–501. Geneva, N.Y., August 1924.

Various species of *Deguelia* (*Derris*) occurring in the Philippines have been tested by H. E. Woodworth for their insecticidal properties, and some data from his experiments are tabulated. Experiments with extracts from the dried roots of one species (probably *D. elliptica*) were made with guineapigs by subcutaneous abdominal injections. These indicate a very slight susceptibility to the action of the poison, as even the smallest amounts used were in excess of that which would be absorbed by light dustings. A commercial extract of 16 per cent. concentration, diluted 1 to 500 and added to water containing mosquitos, killed 65 per cent. of the larvae but did not affect the pupae. The powdered undiluted root sprinkled on the surface of the water killed 90 per cent. of the larvae in 2 to 4 hours. Powdered root diluted to a 20 per cent. concentration with calcium carbonate, as well as commercial derris dusts, completely controlled the chicken lice, *Menopon biseriatum*, Piag., and *Goniocotes gigas*, Tasch., as well as *Gyropus ovalis*, Nitzsch, and *Gliricola porcelli*, L., on guineapigs.

Grassi (B.). **Nach fünfundzwanzig Jahren. Chronologische Uebersicht der Entdeckung der menschlichen Malariaübertragung.** [After Twenty-five Years. A Chronological Review of the Discovery of the Transmission of Human Malaria.]—*Centralbl. Bakt. Paras. Infekt.*, Ite Abt. Orig., xcii, no. 5–6, pp. 392–397. Jena, 22nd August 1924.

The subject-matter of this paper is indicated by its title.

Rodenwaldt (E.). **Speziesassanierung.** [The Control of given Species.]— *Arch. Schiffs- u. Trop.-Hyg.*, xxviii, no. 8, pp. 313–334. Leipzig, August 1924.

This paper deals with the method of anti-malarial work based on combating given species of Anophelines. This method is well illustrated in the work done in recent years in the Dutch East Indies, and the various instances cited are taken from that part of the world. They have already been noticed in this *Review*.

Christophers (S. R.). **Some Himalayan and Peninsular Varieties of Indian Species of** *Anopheles*.— *Ind. Jl. Med. Res.*, xii, no. 1, pp. 11–13. Calcutta, July 1924.

The distribution of *Anopheles gigas*, Giles, and *A. lindesayi*, Giles, in India is peculiar. Both species are restricted to high altitudes, the former never occurring below 5,000 ft. and being found up to 8,000 ft. or more. They are both found throughout the length of the Himalayan chain and in the mountains of South India, where these rise to the required altitudes. These localities are separated by at least 1,200 miles of intervening country, from which the species have never been recorded. As was expected, a careful study of the species has revealed slight varietal distinctions, thus *A. simlensis*, James, is now treated as a variety of *A. gigas*. The typical form of *A. gigas* occurs in the Nilgiris, Kodaikanal Hills, etc.; that of *A. lindesayi* occurs throughout the Himalayas, the southern form being described as *A. lindesayi* var. *nilgiricus*, n.

Specimens received by the author many years ago from Ceylon and figured by him as *A. asiaticus*, Leic., are really *A. annandalei*, Prashad; the former has therefore not yet been recorded from India.

Barraud (P. J.). **A Revision of the Culicine Mosquitoes of India. Parts xiv-xvi.**— *Ind. Jl. Med. Res.*, xii, no. 1, pp. 15–22, 39–46 & 139–143, 5 pls. Calcutta, July 1924.

This is a continuation of previous papers [*R. A.E.*, B, xii, 112]. The present instalments deal respectively with (1) the Indian species of the subgenus *Culiciomyia*, including *Culex* (*Culiciomyia*) *shebbearei*, sp.n., from the eastern Himalayas, the larvae being found in tree-holes in September; (2) the Indian species of the subgenus *Lophoceratomyia*, including *Culex* (*Lophoceratomyia*) *flavicornis*, sp.n., from the Nilgiri Hills and *C.* (*L.*) *plantaginis*, sp.n., from the Western Himalayas; and (3) the Indian species of *Theobaldia*, with a synoptic table.

Iyengar (M. O. T.). **On the Indian Anophelines of the** *funestus* **Group and the Description of a New Species (Diptera, Culicidae).**— *Ind. Jl. Med. Res.*, xii, no. 1, pp. 23–29, 2 figs., 1 pl. Calcutta, July 1924.

The three Indian Anophelines of the *funestus* group now recognised are *Anopheles funestus*, Giles (*listoni*, List.), *A. minimus*, Theo., and *A. minimus* var. *aconitus*, Dön. The discovery of a new form common in Lower Bengal and other parts of India, here described as *A. varuna*, sp.n., has thrown considerable light on the relationships of these species. The characters separating them are described. *A. varuna* is most prevalent during the monsoons in Bengal and breeds principally in

rain-water. A single female from Ceylon appears to belong to this species ; it is also recorded from Karwar. *A. funestus* apparently has a wide distribution, occurring in the N.W. Provinces, Bombay, Bangalore and Bengal. Records from other localities should be accepted with caution, as it is possible that the species concerned may be *A. varuna*. *A. minimus* ranges from China, the Philippines, Java and Malaya to Assam and the Bengal Duars at the foot of the Himalayas. A large number of specimens bred were like *A. funestus* var. *leptomeres*, Theo., and *A. funestus* var. *umbrosus*, Theo., though the author believes that these are only extreme forms of individual variations, and not entitled to varietal status. *A. funestus* var. *umbrosus* has previously only been recorded from Gambia, Africa ; its synonymy is discussed.

Barraud (P. J.). **A New Mosquito from Kashmir and the North-West Frontier Province.**— *Ind. Jl. Med. Res.*, xii, no. 1, pp. 73–74. Calcutta, July 1924.

The female of *Aëdes* (*Finlaya*) *versicolor*, sp.n., here described, was taken in Kashmir at an altitude of 7,500 ft. in the middle of August 1923. Others were taken in the North-West Frontier Province.

Strickland (C.). **The Anophelines** *funestus*, *minimus*, **and** *aconitus*, **including a Description of the Larva of** *minimus*.— *Ind. Jl. Med. Res.*, xii, no. 1, pp. 145–152, 2 pls. Calcutta, July 1924.

The following is the author's abstract of this paper, his conclusions being largely drawn from comparison of the larvae : Of the Anophelines, *A. aconitus*, Dön., *A. minimus*, Theo., and *A. funestus*, Giles (*listoni*, List.), *A. aconitus* is very distinct and little subject to variation, while *A. minimus* and *A. funestus* are not distinct and *A. minimus* should therefore be sunk under *A. funestus*. Certain series of *A. funestus* may be locally distinct, and two species of a western *A. funestus* and an eastern *A. minimus* type are probably in process of differentiation.

A. aconitus should not be considered a variety of *A. minimus* for the larvae of the two are invariably distinct, and a general rule is proposed that this should be a test whether distinct forms be named as varieties or species.

Shortt (H. E.) & Swaminath (C. S.). **Note on** *Nosema adiei* (**Christophers, 1922**).— *Ind. Jl. Med. Res.*, xii, no. 1, pp. 181–183, 1 pl. Calcutta, July 1924.

Although *Nosema adiei* [*R. A. E.*, B, x, 136, 197] is by no means common, it has on several occasions been the source of confusion to workers investigating the possible rôle of the bed-bug, *Cimex hemiptera* (*rotundatus*), in the transmission of kala-azar, and on this account a short description of the forms met with is given.

Gill (C. A.). **Malaria in the Punjab. The Epidemic Forecast for the Year 1923.**— *Ind. Jl. Med. Res.*, xii, no. 1, pp. 185–193, 1 map. Calcutta, July 1924.

As has been shown in the analyses of the previous forecast [*R. A. E.*, B, xii, 10], it has been possible to predict with considerable accuracy the occurrence of mild and circumscribed epidemics of malaria in the

Punjab, but the value of the method has not yet been tested in years when an epidemic of wide diffusion and marked toxicity has prevailed in the province. Epidemic conditions during the autumn of 1923 were more pronounced than in any previous year (with the exception of 1917) during the past 15 years. The same degree of accuracy was maintained in the predictions as in the previous two years; in view of these facts and the independent testimony afforded on the present occasion of the facility with which an accurate forecast of epidemic malaria can be prepared, it is permissible to assume that the hypothesis upon which the method of forecasting is based is something more than a mere epidemiological speculation.

Matheson (R.). **The Genera of Culicidae of North America.**—*Canad. Ent.*, lvi, no. 7, pp. 157–161, 11 figs. Orillia, Ont., July 1924.

In preparing this key the characters used are the same as those adopted by Edwards [*R. A. E.*, B, x, 17], whose paper was published just as this work was completed. Several changes for the American genera are involved. *Culex melanurus*, Coq., should be transferred to *Theobaldia*, and *Janthinosoma* (subgenus of *Psorophora*) and *Coquillettidia* (subgenus of *Taeniorhynchus*) should probably be raised to generic rank.

Steiner (G.). **Remarks on a Mermithid found Parasitic in the Adult Mosquito** (*Aëdes vexans*, **Meigen**) **in B.C.**—*Canad. Ent.*, lvi, no. 7, pp. 161–164, 7 figs. Orillia, Ont., July 1924.

Paramermis canadensis, sp.n., is described from *Aëdes vexans*, Meig., in British Columbia. On one occasion 80 per cent. of both sexes of the mosquito were infested, the parasites apparently interfering with the development of the ovaries of the female. A single individual of *A. aldrichi*, Dyar, out of 110 examined, was found to harbour a small Nematode of uncertain identity.

Mosquito Control in New Jersey.—*Proc. 10th Ann. Meeting New Jersey Mosquito Exterm. Assoc., Atlantic City, N. J., February 1923*, 128 pp. New Brunswick, N.J., 1923. [Received 3rd September 1924.]

This is a series of reports on recent mosquito extermination work in New Jersey. Dr. L. O. Howard's paper has already been noticed [*R. A. E.*, B, xii, 76]. A general plan for mosquito work in the southern States is described by J. A. LePrince; T. J. Headlee contributes a statement on the New Jersey mosquito problem; methods of dealing with the fresh water mosquitos are outlined by R. del Tufo, and those for the salt water mosquitos by F. R. Riley. Other papers included are "The Psychology of the Public relative to Mosquito Work," by J. G. Lipman; and "Mosquito Investigation in Western Canada" by A. Gibson; while "The Accomplishment in the Past Year in Anti-mosquito Work" is described from Connecticut by S. T. Sealy, from Greater New York by E. Winship, and from Nassau County, Long Island, by W. DeMott. "The Prospects of State-wide Mosquito Control in Florida" are outlined by G. W. Simons, Jr., and brief reports are sent in from various counties describing progress during the year.

DYAR (H. G.). **A Note on** *Sabethes*, **Robineau-Desvoidy (Diptera, Culicidae).**— *Insecutor Inscitiae Menstruus*, xii, no. 7–9, pp. 97–100. Washington, D.C., July-September 1924.

Sabethinus is treated as a synonym of *Sabethoides*, this being merely a subgenus of *Sabethes*. A key is given to the American species of *Sabethes* and the following new names are suggested: *Sabethes remipusculus* for *S. pupureus*, Peryassú (nec *Sabethoides purpureus*, Theo.); and *Sabethes melanonymphe* for *Sabethinus albiprivatus*, Theo. (nec *Sabethes albiprivatus*, Theo.).

DYAR (H. G.). **Notes on some Sabethids from Central America (Diptera, Culicidae).**— *Insecutor Inscitiae Menstruus*, xii, no. 7–9, pp. 101–104. Washington, D.C., July-September 1924.

The synonymy of the following species is discussed: *Wyeomyia guatemala* D. & K., *W. homothe*, D. & K., *W. abebela*, D. & K., *W. celaenocephala*, D. & K., *W. gynaecopus*, D. & K., and *W. hemisagnosta*, D. & K.

DYAR (H. G.). **Notes on the Sabethids of the West Indies (Diptera, Culicidae).**— *Insecutor Inscitiae Menstruus*, xii, no. 7–9, pp. 104–107. Washington, D.C., July-September 1924.

Notes are given on a number of species of *Wyeomyia* from the West Indies, and on *Goeldia perturbans*, Will., the larva of which is predacious on that of *W. pertinans*, Will., and *Sabethes bipartipes*, D. & K., also probably predacious.

DYAR (H. G.). *Phoniomyia* **and** *Dendromyia*, **Theobald (Diptera, Culicidae).**— *Insecutor Inscitiae Menstruus*, xii, no. 7–9, pp. 107–113. Washington, D.C., July-September 1924.

The author now treats *Phoniomyia*, Theo. (*Dodecamyia*), to the species of which a key is given, and *Dendromyia*, Theo., as subgenera of *Wyeomyia*. Their status is discussed, and a new subgeneric name, *Phyllozomyia*, is proposed for *Dendromyia*, as hitherto used by the author.

DYAR (H. G.). **A Note on** *Wyeomyia*, **Theobald (Diptera, Culicidae).**— *Insecutor Inscitiae Menstruus*, xii, no. 7–9, pp. 113–117. Washington, D.C., July-September 1924.

The genus *Wyeomyia* is discussed, a key being given to the species. The synonymy of various species is also dealt with, including *W. quasiluteoventralis*, Theo. (*fallax*, Bonne-Wepster & Bonne), from British and Dutch Guiana, and *W. telestica*, D. & K. (*abascanta*, D. & K.), from Trinidad.

DYAR (H. G.). **Note on the American** *Aëdes* **of the** *scapularis* **Group.**— *Insecutor Inscitiae Menstruus*, xii, no. 7–9, pp. 117–119. Washington, D.C., July-September 1924.

In a previous paper [*R. A. E.*, B, x, 130], the author was unable to give a table for the separation of the species by the male genitalia. The forms are now regrouped, some of those previously considered as racial forms, including *Aëdes euplocamus*, D. & K., *A. infirmatus*, D. & K., and *A. condolescens*, D. & K., being given specific rank.

DYAR (H. G.). **Some New Mosquitoes from Colombia (Diptera, Culicidae).**— *Insecutor Inscitiae Menstruus*, xii, no. 7–9, pp. 119–124, 1 pl. Washington, D.C., July-September 1924.

The species described are : *Wyeomyia* (*Wyeomyia*) *camptocomma*, bred from the bases of the leaves of *Caladium* ; *Culex* (*Culex*) *aglischrus*, bred from a deep hole in the ground ; *C.* (*Choeroporpa*) *sursumptor*, bred from a pool ; and *C.* (*C.*) *ligator*, bred from a pool in a stream bed that was nearly dry, associated with *Anopheles pseudopunctipennis*, Theo., and *Culex coronator*, D. & K.

DYAR (H. G.). **Two New Mosquitoes from California (Diptera, Culicidae).**— *Insecutor Inscitiae Menstruus*, xii, no. 7–9, pp. 125–127. Washington, D.C., July-September 1924.

The species described are : *Culex badgeri*, sp.n., bred from individuals associated with *Theobaldia* (*Culiseta*) *inornata*, Will., and *T.* (*C.*) *maccrackenae*, D. & K. ; and *Aëdes melanimon*, sp.n.

DYAR (H. G.). **A New Mosquito from Siberia (Diptera, Culicidae).**— *Insecutor Inscitiae Menstruus*, xii, no. 7–9, pp. 127–128. Washington, D.C., July-September 1924.

Culex exilis, sp.n., is described from two males taken at Vladivostok in July 1923.

DYAR (H. G.). **Mosquitoes from Chile (Diptera, Culicidae).**— *Insecutor Inscitiae Menstruus*, xii, no. 7–9, pp. 128–131. Washington, D.C., July-September 1924.

The species dealt with include *Aëdes philippii*, n.n., for *Aëdes* (*Culex*) *vittatus*, Philippi, nec Bigot, and *A. colonarius*, sp.n., described from a female.

DYAR (H. G.). **The Larva of** *Aëdes alleni*, **Turner (Diptera, Culicidae).** —*Insecutor Inscitiae Menstruus*, xii, no. 7–9, pp. 131–132. Washington, D.C., July-September 1924.

The larvae described were taken from a hole in a willow tree in Texas.

DYAR (H. G.). **The Larva of** *Aëdes thelcter*, **Dyar (Diptera, Culicidae).**— *Insecutor Inscitiae Menstruus*, xii, no. 7–9, p. 132. Washington, D.C., July-September 1924.

The larva of *Aëdes thelcter*, Dyar, is described from Texas.

CAUDELL (A. N.). **Some Insects from the Chilibrillo Bat Caves of Panama.**— *Insecutor Inscitiae Menstruus*, xii, no. 7–9, pp. 133–136, 1 pl. Washington, D.C., July-September 1924.

This list of insects chiefly comprises Orthoptera. Others include *Triatoma geniculata*, Latr., perhaps feeding on the bats ; *Drosophila funebris*, Fall., bred from bat guano ; and the Streblid bat parasites, *Nycterophila coxata*, Ferris, and *Trichobius caecus*, Edw.

DYAR (H. G.) & SHANNON (R. C.). **Another New *Culex* from Panama (Diptera, Culicidae).**— *Insecutor Inscitiae Menstruus*, xii, no. 7–9, pp. 143–144. Washington, D.C., July-September 1924.

Culex (*Melanoconion*) *ruffinis*, sp.n., is described from a male taken in July 1923.

DYAR (H. G.). **The Larva of *Culiseta maccrackenae*, Dyar & Knab (Diptera, Culicidae).**— *Insecutor Inscitiae Menstruus*, xii, no. 7–9, p. 144. Washington, D.C., July-September 1924.

The larva of *Theobaldia* (*Culiseta*) *maccrackenae*, D. & K., was taken from very slimy stagnant water in a tub in which cactus leaves were being macerated.

COOLING (L. E.). **A Synonymic List of the more Important Species of Culicidae of the Australian Region.**— *Australia Dept. Health*, Serv. Pubn. (Trop. Div.), no. 2, 61 pp. Melbourne, 1924.

This synonymic list of the Culicids of the Australian Region brings together in a handy form the results of work by Edwards [*cf. R. A. E.* B, xii, 113] and other authors. The index admits of determining a synonym to the valid name without further reference.

CILENTO (R. W.). **Malaria, with Especial Reference to Australia and its Dependencies.**— *Australia Dept. Health*, Serv. Pubn. (Trop. Div.), no. 3, 141 pp., 35 figs. Melbourne, 1924.

Malaria was introduced into tropical Australia subsequent to its occupation by Europeans. Whether its present comparative mildness and sparseness in an endemic form will continue is uncertain. The present review is issued to provide a comprehensive summary of modern knowledge of the disease, with a view to the particular conditions and needs of Australia.

CILENTO (R. W.). **Filariasis, with Especial Reference to Australia and its Dependencies.**— *Australia Dept. Health*, Serv. Pubn. (Trop. Div.), no. 4, 78 pp., 14 figs. Melbourne, 1924.

This paper presents in a concise form a comprehensive summary of modern knowledge of filariasis as transmitted by mosquitos, and is written chiefly for the assistance of medical practitioners in Australia and its tropical territories. The control of the disease will involve the extermination, in the infected areas, of the mosquitos responsible for its transmission, and the use of mosquito nets by all persons harbouring microfilariae in their blood. The two known vectors in Australasia are *Culex fatigans* (*quinquefasciatus*) in Australia and *Aëdes* (*Stegomyia*) *variegatus* (*pseudoscutellaris*) in New Guinea, while several species of less importance occur and are probably capable of transmission. A short account of each species and its distribution is given.

Cooling (L. E.). **The Larval Stages and Biology of the commoner Species of Australian Mosquitoes, with the Biology of *Aëdes pecuniosus*, Edwards.**—*Australia Dept. Health*, Serv. Pubn. (Trop. Div.), no. 8, 40 pp., 15 figs. Melbourne, 1924.

A description is given of the larval stages of some of the commoner species of Australian mosquitos, including *Megarhinus* (*Toxorhynchites*) *speciosus*, Skuse; *Lutzia halifaxi*, Theo.; *Rachionotomyia* (*Rachisoura*) *atripes*, Skuse; *Mucidus alternans*, Westw.; *Aëdes* (*Stegomyia*) *argenteus*, Poir. (*aegypti*, L.); *A.* (*Finlaya*) *notoscriptus*, Skuse; *A.* (*F.*) *pecuniosus*, Edw. (of which the adult male is described); *A.* (*Ochlerotatus*) *vigilax*, Skuse; *A.* (*O.*) *alboannulatus*, Macq.; *Culex fatigans*, Wied. (*quinquefasciatus*, Say); *C. sitiens*, Wied.; and *C. annulirostris*, Skuse. Notes are given on the breeding-places, habits and biology of these species.

Johnston (T. H.) & Bancroft (M. J.). **Experiments with certain Diptera as possible Transmitters of Bovine Onchocerciasis.**—*Proc. R. Soc. Queensland*, xxxii, pp. 31–57, 16 figs. Brisbane, 20th January 1921. [Received 8th September 1924.]

This paper has already been noticed from an abstract published elsewhere [*R. A. E.*, B, viii, 174].

Nicolle (C.) & Anderson (C.). **Recherches expérimentales sur le mode de transmission du Kala Azar.**—*Arch. Inst. Pasteur Tunis*, xiii, no. 2, pp. 154–164. Tunis, June 1924.

Further experiments on the transmission of canine kala-azar are described, which confirm previous results [*R. A. E.*, B, xi, 168]. It is definitely concluded that *Ctenocephalus canis* does not transmit the disease. A summary of both these and the previous experiments is given.

Dekester (M.) & Melnotte (P.). **Premier cas de Leishmaniose cutanée observé chez un indigène au Maroc en dehors des zones sahariennes.**—*Bull. Soc. Path. exot.*, xvii, no. 7, pp. 565–568, 1 fig. Paris, 1924.

The first case is recorded of Oriental sore in a native of Morocco, which has hitherto (at least on its western side) seemed to be free from the disease. This case, which is described, occurred in the centre of western Morocco, close to Fez. An investigation on the spot is planned. *Phlebotomus* is known to occur fairly commonly in the region of Fez, *P. papatasii* having been recorded on several occasions. A rather remarkable fact was that in this case the disease became apparent in early April, at a period when it generally disappears, the probability being that the bite occurred at the end of the preceding summer; very little is known of the incubation period of the disease.

Charrier (H.). **Les Moustiques de la région de Tanger (Maroc).**—*Bull. Soc. Path. exot.*, xvii, no. 7, pp. 570–572. Paris, 1924.

In addition to mosquitos previously recorded from Morocco [*R. A. E.*, B, iv, 85; xi, 173], the author, who has made a study of the species found in the Tangier zone, records also *Culex pipiens* (very numerous

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in houses) ; *C. laticinctus* (very rare) ; *C. hortensis* and *C. apicalis*, only found in the larval stages, in association with *Anopheles maculipennis* ; *Theobaldia morsitans*, found rarely and only in the larval stage ; *T. longiareolata*, found rather frequently ; and *Anopheles hyrcanus* (*sinensis*), rare, and found only in the larval stage.

Adie (H.). **The Sporogony of** *Haemoproteus columbae*.—*Bull. Soc. Path. exot.*, xvii, no. 7, pp. 605–613, 5 figs. Paris, 1924.

The author confirms and completes her previous researches, an account of which was published in 1915, on the sporogonic cycle of *Haemoproteus columbae*, showing that the cycle is analogous with that of malaria parasites. The development of *Haemoproteus columbae* has been completely traced in the Hippoboscid, *Lynchia maura*, and the different phases of sporogony up to the formation of the sporozoites that invade the salivary glands of the insect are described and figured. Infestation of young pigeons by the sporozoites of the salivary glands has been obtained, thus definitely elucidating the points hitherto considered obscure in the parasitic cycle.

Florence (L.). **An Intracellular Symbiont of the Hog Louse.**—*Amer. Jl. Trop. Med.*, iv, no. 4, pp. 397–409, 2 pls. Baltimore, Md., July 1924.

A symbiont is discussed that is present in *Haematopinus suis*, L. (hog louse) throughout its life-history, and is located in mycetocytes on the wall of the mid-intestine. Also, in the female there is a well-developed mycetome in each oviduct. They are transmitted through the egg. The symbiont is thought to be related with the physiology of digestion, and it is possible that pig's blood is essential to its well being and so to the life of the louse. This may explain the high mortality and inability to raise a second generation when the lice are removed from their natural host and fed on man.

Plum (N.). **Et Tilfaelde af Cardiaspasme hos en Hund, rimeligvis fremkaldt af** *Pentastomum taenioides*. [A Case of cardiac Spasm in a Dog most probably caused by *Linguatula taenioides*.] **Aksedrejning af Maven hos en Hund. Tillaeg til Artiklen om et Tilfaelde af Cardiaspasme hos en Hund.** [Torsion of a Dog's Stomach. Appendix to the above Paper.]—*Maanedsskrift for Dyrlaeger*, xxxv, pp. 509–523 & 639–674. Copenhagen, 1923.

A case is recorded of the Linguatulid mite, *Linguatula* (*Pentastomum*) *taenioides*, infesting a dog.

Petersen (A.). **Bidrag til de danske Simuliers Naturhistorie.** [Contributions to the Knowledge of the Danish Simuliids.]—*D. kgl. danske Vidensk. Selsk. Skrifter. Naturv. og mathem. Afd.*, 8th ser., v, no. 4, 107 pp., 2 pls., 54 figs. Copenhagen, 1924.

This monograph deals with the morphology and classification of the Danish Simuliids and also their biology ; and detailed descriptions are given of the adults, larvae and pupae of the ten known Danish species together with keys. The serious outbreak of Simuliids recorded in 1918 [*R. A. E.*, B, vii, 172] is now known to have been caused by *S. argyreatum*, which is the most virulent species. Other species found attacking domestic animals are *S. ornatum*, *S. venustum* and *S. equinum*.

[Pavlovski (E. N.).] **Павловский (Е. Н.). Руководство к практической паразитологии человека.** [Handbook of Practical Parasitology of Man.]—**Государственное Издательство** [*Govt. Publ.*], 292 pp., 3 pls., 184 figs. Leningrad, 1924. Price 4r. 50k.

This handbook is the first original Russian work of its kind. Both internal and external parasites of man are dealt with in detail, the latter including many insects as either direct parasites or vectors of disease. A systematic list is given of the various parasites discussed, with brief notes on the effect of their attack. An extensive bibliography arranged under subjects is also appended. It is hoped that the handbook will emphasise and confirm the importance of this branch of biology and induce further original work on the subject.

Pavlovski (E. N.). **1. Bemerkungen über zoologische Methodik.** [1. Remarks on zoological Technique.]—*Zool. Anz.*, lix, pp. 284–287, 1 fig. Leipzig, 1924.

This paper on methods of examining parasitic insects has been noticed from another source [*R. A. E.*, B, xii, 141].

Colombe (J.) & Foulkes (D.). **Myiases du tube digestif.**—*Gaz. des Hôpit.*, xcvii, no. 1, p. 5. Paris, 1st & 3rd January 1924.

Two cases of intestinal myiasis in man are described. One was due to *Piophila casei* and the other to a species of *Anthomyia*.

Pavlovski (E. N.) & Stein (A. K.). **Experimentelle Läusestudien. II. Ueber die Wirkung des Speichels des *Pediculus* auf die Integumenta des Menschen.** [Experimental Studies on Lice. II. The Action of the Saliva of *Pediculus* on the Skin of Man.]—*Zeitschr. gesamte exptl. Medizin*, xlii, no. 1–3, pp. 15–24, 3 figs. Berlin, 1924.

This paper has been noticed already from other sources [*R. A. E.*, B, xii, 81].

[Shapsheva (K. N.).] **Шапшева (К. Н.). Детали переноса европейского возвратного тифа вшами.** [Details of the Transmission of European Recurrent Fever by Lice.]—**Врач. Дело** [*Med. Practice*], 1924, no. 1–2, separate 11 pp. Kharkov, 1924.

During a recent epidemic (1922–1923) of recurrent fever in Russia extensive transmission experiments were carried out with different lice. The work of others in North Africa was apparently concerned with *Spirochaeta berbera* and not *S. recurrentis* (*obermeieri*). It has been found that the latter spirochaete from the blood of a patient either during the first or second attack, when once in the mid-gut or stomach of the louse is very soon changed ; after 3 hours it becomes granular and difficult to stain and entirely disappears within 12 hours at 22–25° C. [71·6–77° F.]. For 10 days after their disappearance from the stomach the spirochaetes could not be traced in any part of the louse, but from the 11th to the 20th day after the infectious feed they appeared again in its tissues. In the case of lice feeding on infected persons under natural conditions (as opposed to experimental feeding), this invisible stage is probably of shorter duration, as spirochaetes were found in lice removed from patients on the 5th day of illness. In this case, however,

migration from another patient may have occurred. When the spirochaetes reappear in the lice they have the same appearance and colouration as those found in human blood. Most of the spirochaetes were found in the haemolymph of the louse, which is probably their chief habitat, their occurrence in other organs depending on the amount and proximity of the haemolymph. The number of spirochaetes in the haemolymph is too great for them all to have been obtained from the patient's blood, so that development in the tissues of the louse must undoubtedly occur. The latest occurrence of the spirochaetes observed in the louse was 20 days after an infectious feed, but it is possible that they may be preserved for a longer period.

This cycle of development has been observed in *Pediculus humanus* and *P. capitis*, both therefore being implicated in the transmission of recurrent fever. Sufficient data have not yet been collected to express any opinion regarding the part played by *Phthirus pubis*.

The developmental cycle is the same in females and males, though in the former spirochaetes were more frequently found. These observations suggest that under normal conditions the spirochaetes always remain within the louse, and this theory has been confirmed by further experiments proving that European recurrent fever is not transmitted by the *bite* of the insect vector. Transmission is probably effected in a similar manner as in the case of North African recurrent fever caused by *S. berbera*, that is by infection from part of a crushed louse through the broken skin or through the mucus of the eyes or nose. To produce this infection it is not necessary that the louse should be completely crushed, as a slight injury (breaking off of an extremity) will release sufficient haemolymph to produce infection.

In no case were spirochaetes found in lice fed on patients during the stage of apyrexia; this fact is of great epidemiological importance, showing that the patient during this stage is non-infective through the medium of the louse, though his blood is infective. Not every individual louse, even under most favourable circumstances, is necessarily infected when feeding on a case of recurrent fever, this being particularly noticeable at the period of dying down of an epidemic. The occurrence of spirochaetes in the excreta of the louse is very exceptional and is not considered of epidemiological importance. The occurrence of the invisible stage in the excreta cannot, of course, be ascertained without experiments on animals.

The periodicity of recurrent fever does not seem to depend, as has previously been thought, on the advent of warm weather and consequent change in conditions of life, and the resulting diminution in the numbers of lice, but rather on conditions preventing the usual development of the spirochaetes in the lice. No spirochaetes were found in lice after three feeds on infected persons in March 1923, when the incidence of the disease exhibited an acute diminution. In 1922, on the other hand, naturally infected lice were observed in June, and the incidence of the disease did not diminish until August.

A comparison with relapsing fever, transmitted by the bite of ticks, leads to the belief that in the evolution of parasitisation of Arthropods by spirochaetes lice are comparatively recent hosts.

WILLIAMSON (J. B.). **A Possible Case of Tick Typhus.**— *Jl. R.A.M.C.*, xliii, no. 4, pp. 291–292. London, October 1924.

A case is described from the Central Provinces, India, which in its clinical aspect greatly resembled Rocky Mountain fever, and although

there is no direct evidence of tick bite, this method of infection is suspected. The patient was a European, and the camp was full of Ixodid ticks.

TUBANGUI (M. A.). **Two Larval Parasites from the Philippine Palm Civet** (*Paradoxurus philippinensis*).—*Philippine Jl. Sci.*, xxiv, no. 6, pp. 749–753, 2 figs. Manila, June 1924.

One of two larval parasites found in the abdominal cavity of *Paradoxurus philippinensis* was a Linguatulid, *Armillifer moniliformis* var. *heymonsi*, Sambon, which has previously been reported in man from the Philippine Islands. The source of infestation is the python, in the lungs of which the sexually mature mites live and lay their eggs. If introduced into a suitable intermediate host, which is usually an animal preyed upon by pythons, the eggs develop into nymphal forms, which migrate through the tissues of the body until they become encysted. Owing to the frequent occurrence of these snakes in the vicinity of houses, the danger of the eggs being transmitted to man is appreciable.

NARAYAN RAO (M. A.). **Observations on the Morphology and Life-cycle of** *Filaria recondita*, **Grassi.**—*Vet. Jl.*, lxxx, no. 10, pp. 383–393, 12 figs. London, October 1924.

This paper has been noticed from another source [*R. A. E.*, B, xi, 161].

GAMINARA (A.). **Estudio experimental sobre** *Schizotrypanum cruzi* **y enfermedad de Chagas en el Uruguay.** [Experimental Study of *Trypanosoma cruzi* and Chagas' Disease in Uruguay.]—*Anales Facultad Medicina*, viii, no. 3–4, pp. 311–359, 7 pls. Montevideo, March–May 1923.

At least two vectors of *Trypanosoma* (*Schizotrypanum*) *cruzi*, the Reduviid bugs, *Triatoma infestans*, Klug, and *T. rubrovaria*, Blanch., occur in Uruguay, mainly in the north-west and centre. These Reduviids are infected with intestinal flagellates that agree with the developmental forms described by Chagas in the cycle of *T. cruzi*. In experimental infections of animals the disease was usually of a benign character, but occasionally proved fatal. Although the trypanosome has not yet been found in man in Uruguay, probably because no examination has been made of the blood in acute cases that were suspicious, the myxoedematous, cardiac and nervous types of the disease have been recorded clinically.

WHITE (J. H.). **Epidemiologia da febre amarella.** [The Epidemiology of Yellow Fever.]—*A Folha Medica*, v, no. 17, pp. 193–197. Rio de Janeiro, 1st September 1924.

This is a survey of the epidemiology of yellow fever. It is possible that *Aëdes albopictus* (*scutellaris*) is a vector as well as *A. argenteus* (*aegypti*). Steamer traffic is not a means of spread that needs to be considered, because infected mosquitos are usually found in places that are shaded, humid, and afford abundant food, and are not likely to venture into the sunny, wind-swept mooring places. It is only very rarely that steamers can carry the disease to ports at a distance of a 10 days' voyage. The eradication of yellow fever resolves itself into

the elimination of breeding-places or, in the case of such preferred ones as water tanks, cisterns, etc., the prevention of mosquito-breeding by screening and stocking with mosquito-destroying fish.

Wright (W. R.). **The Mosquitoes of North Wales.**—*Ent. Mo. Mag.*, lx, pp. 208–210. London, September 1924.

Up to the present 13 species of mosquitos have been reported from North Wales. The object of this paper is to collect published records of the rarer species, to which have been added a few hitherto unpublished ones.

Use of Fish for Mosquito Control.—*Rockefeller Foundation, Internat. Health Bd. 10th Ann. Rept. 1923*, pp. 80–93, 10 figs. New York, January 1924. [Received 15th September 1924.]

This paper is a brief summary of all available literature on the use of fish against mosquito larvae. Within limits this method is likely to take an important place as a recognised measure in the control of both yellow fever and malaria.

Swellengrebel (N. H.). **Le Paludisme aux Pays-Bas.**—*Sine loco*, n.d., 22 pp., 6 charts. [Received 6th October 1924.]

The author presents some aspects of the epidemiology of malaria in Holland that may be of general interest, especially in view of opinions that have been expressed in other countries. The disease in Holland is of secondary importance. While a good deal of land has been reclaimed from the sea, it cannot be stated definitely that favourable breeding-grounds for *Anopheles maculipennis* have thus been established, though possibilities of increase in malaria have certainly been produced by allowing a greater density of population in these areas. Although a good deal of money is spent each year in anti-mosquito measures in Holland, in some places where only such ordinary measures as the destruction of mosquitos in stables are practised the decrease in numbers has been almost as good. Roubaud's theory regarding the protection afforded by the presence of cattle and the consequent zoophilism shown by mosquitos is discussed with respect to Holland, and, on the whole, observations in that country confirm it. There are certain modifications necessary; for example, in the rural or semi-rural districts outside Amsterdam, the houses that have contiguous stables harbouring various domestic animals are found to contain many more Anophelines than those that have no stables. Still, the theory is held to explain in a great measure the phenomenon of the presence of Anophelines without malaria, which is so common in Holland.

Swellengrebel (N. H.). **Nadere bijzonderheden over de herfst- en winterbesmetting met malariaparasieten van** *A. maculipennis* **om Amsterdam.** [More precise Particulars regarding the Autumn and Winter Infection of *Anopheles maculipennis* with Malaria Parasites around Amsterdam.]—*Nederl. Tijdschr. Geneesk.*, lxviii, 2nd Half, no. 6, pp. 750–763. Amsterdam, 1924.

Females of *Anopheles maculipennis* captured in 1920–1922, from malaria patients in houses (especially in bedrooms) around Amsterdam

seldom harboured oocysts of malarial parasites between May and August, whereas they were common between September and April, and particularly between September and December. The percentage of infected mosquitos and the number of oocysts per mosquito were large even when compared with results in tropical regions. These ratios seem to depend on the degree of infection in man. The number of mosquitos with mature oocysts increases from October to December, and some of the oocysts give rise to sporozoites in the salivary glands, especially in November and December, but also in October and from January to March. In February and March new oocysts appear. It is probable that this early spring generation also matures. Some of the mature oocysts do not disappear, but remain as remnants of the autumn-winter generation among the early spring one. As the Anophelines suck blood during the winter, the sporozoites must be inoculated into man from October to March, chiefly in November and December. It must be assumed either that the infection of man occurs but remains latent during the winter, or that the sporozoites have actually lost their power of growth, except those that have already become mature in October or do not become mature until February and March. It is probable that infected mosquitos are present in summer ; some have been found, and the condition of oocysts observed in September points to infection in August. The course of the malarial epidemic of former years suggests that winter infection was then of greater practical importance than at present. In houses with stables more Anophelines were captured in bedrooms than was the case in those without them. This depends not only on the presence of cattle, but also on the construction of the old-fashioned rural dwellings, which afford more shelters for mosquitos than modern town houses. Until it is proved that the infected Anophelines of the winter half-year are non-injurious, measures against Anophelines in and around Amsterdam from September to April are advocated. The extension of these measures to summer is not advised, as the probability of killing infected mosquitos is then very small.

The above data show that the parasite of benign tertian malaria can develop in *A. maculipennis* at a period when the temperature is too low for development according to out-door observations. This points to the necessity (in the case of an indoor species such as *A. maculipennis* as opposed to an outdoor one such as *A. bifurcatus*) of reckoning with the temperature indoors and disregarding the temperature outside.

SWELLENGREBEL (N. H.). **Over de dichtheid der *Anopheles*-bevolking om Amsterdam in de afgeloopen vier jaren.** [On the Density of the Anopheline Population around Amsterdam in the past four Years.] —*Nederl. Tijdschr. Geneesk.*, lxviii, 2nd Half, no. 9, pp. 1113–1125. Amsterdam, 1924.

During anti-mosquito work of the past 4 years around Amsterdam counts in houses and stables show a decrease of Anophelines in 1922 followed in 1923 by an appreciable increase, especially in the stables. On the other hand, many consider the number of mosquitos to have been smaller in 1923 than in some of the preceding years. This cannot be explained by a diminished attraction of *Anopheles maculipennis* towards man. If a decrease in numbers did occur, it can be quite as well explained by the notably smaller fertility of the females as by the

effect of the measures taken. The fall in numbers in 1922, however, was due to anti-mosquito work. There seems to be good reason for believing that the number of *A. maculipennis* per house in January, February and March is of more influence on the amount of malaria in the subsequent season than in other periods of the year. There is usually no general connection between the number of Anophelines and the amount of malaria, so that while a reduction of Anophelines infers efficacy of the measures adopted it does not imply a decrease of malaria.

Boyd (J. S. K.). **The Principles of the Prophylaxis of Malaria : with the Administrative and other Measures for their Application on Active Service.**—*Jl. R. A.M.C.*, xliii, nos. 2 & 3, pp. 95–100 & 182–201. London, August & September 1924.

A general account is given of malaria, the parasite causing it, and the mode of infection, as well as of its treatment and of the general preventive measures applicable on active service. A great deal of the information is compiled from existing literature.

Wixforth (E.). **Der Herzschlag der Culicidenlarven unter natürlichen und künstlichen Bedingungen.** [The Heart-beat of Culicid Larvae under natural and artificial Conditions.]—*Arch. Natg.*, Abt. A, xc, no. 5, pp. 193–240, 14 figs. Berlin, September 1924.

Experiments are described that were carried out to test the influence on the heart-activity of larvae of *Culex pipiens*, L., *Aëdes rusticus*, Rossi (*diversus*, Theo.) and *Mochlonyx culiciformis*, DeG. (*velutinus*, Ruthe) of temperature, of certain neutral salts, used singly or mixed, and of certain poisons acting on the heart and nervous system.

Copeland (E. B.). **Rice.** 8vo, xiv+352 pp., 28 pls. London, Macmillan & Co., Ltd., 1924. Price 20*s*.

The relation between rice culture and malaria is briefly discussed in the concluding pages of this book. All statistics tend to show that the conversion of swamps into rice-fields is eminently favourable to health. It is not claimed that rice culture and malaria cannot exist together ; it is only where malaria is already present that rice improves conditions. In some instances the failure of mosquitos to breed in rice-fields has been recorded.

Brahmachari (B. B.). **Flood Flushing and Malaria in the Kumarkhali Municipality.**—*Calcutta Med. Jl.*, xviii, no. 2, pp. 342–347, 1 plan. Calcutta, August 1923.

Kumarkhali, a small town in Bengal, is notorious for malaria. The local conditions making drainage and oiling out of the question, recourse was had to flood flushing by digging a channel and adjusting the surface drains. In the monsoon season the town was practically flooded, only the houses and roads being above the flood level, but, as a consequence of the flushing, there was a marked improvement in the malaria in the town.

Reijntjes (E. J.). **Vischvijvers en malariabestrijding.** [Fish-ponds and Malaria Control.]—*Teysmannia*, xxxiii, no. 5–6, pp. 241–253. Batavia, 1922. [Received 7th October 1924.]

In their investigations on the part played by fish-ponds in relation to malaria in Java, van Breemen and Sunier [*R. A. E.*, B, vii, 96 ; ix, 36] concluded that the particular ponds examined by them encouraged the breeding of *Anopheles ludlowi* and consequently malaria. It has been assumed elsewhere that all fish-ponds must necessarily encourage malaria, but this is not the case. The conditions laid down as unfavourable to *A. ludlowi* are those present in fish-ponds properly managed with a view to obtaining a large yield of fish. The value of such sources of food in improving public health is considerable.

Schuurmans Stekhoven (J. H.) & Schuurmans Stekhoven-Meijer (A. W.). **Aanteekeningen omtrent anophelinenbroedplaatsen op de Bandoengsche Hoogvlakte.** [Notes on Anopheline Breeding-places on the Bandoeng Plateau.]—*Geneesk. Tijdschr. Ned.-Indië*, lxiv, no. 4, pp. 588–591. Batavia, 1924.

These observations on the breeding-places of Anopheline mosquitos in the Bandoeng plateau, Java, were made some years ago, but have not been published.

The following species occur : *Anopheles* (*Cellia*) *kochi*, *A.* (*Myzomyia*) *vagus*, *A.* (*M.*) *punctulatus*, *A.* (*Myzorhynchus*) *hyrcanus* (*sinensis*), *A.* (*M.*) *barbirostris*, *A.* (*Nyssorhynchus*) *fuliginosus*, *A.* (*Myzomyia*) *subpictus* (*rossi*), and *A.* (*M.*) *ludlowi*. Most of the larvae taken were those of *A. barbirostris*, and these were found in fish-ponds, rice-fields, irrigation channels and roadside pools. *A. barbirostris* has a wide distribution, and occurred as high as 5,000 feet above sea-level. *A. vagus* is very general, but less so than the preceding species. Some of the larvae, apparently those of *A. vagus*, yielded adults of *A. subpictus*. The preference of *A. vagus* for dirty water was again confirmed. *A. fuliginosus* is far from rare. It occurred as high as 5,000 feet. *A. kochi* and *A. hyrcanus* were taken at 3,000 feet. Larvae of the *A. ludlowi* type were rare. In view of other observations the authors believe that they would have yielded adults of *A. subpictus* had it been possible to breed them out. In conclusion, while Anophelines occur throughout the Bandoeng plateau they are not abundant and the species are not important as regards malaria.

Bijlmer (H. J. T.). **De Malaria. (Uit de geneeskundige verslagen der wetenschappelijke Centraal-Guinea Expeditie 1920-1921.** [Malaria. (From the Health Reports of the Scientific Central New Guinea Expedition 1920–1921.)]—*Geneesk. Tijdschr. Ned.-Indië*, lxiv, no. 4, pp. 600–631, 1 pl. Batavia, 1924.

The expedition to Central New Guinea landed in February 1920 at the Pioneer Bivouac on the Mamberano River. The locality seemed to be poor in mosquitos, but was so only apparently, as became evident when malaria became rife in April. The Anopheline concerned was *Anopheles* (*Neomyzomyia*) *punctulatus*, and the larvae occurred in small puddles. In July two marshes near the camp were breeding-places and became the principal ones in November and December. At two inland camps, Batavia Bivouac and Prauwen Bivouac, all the

breeding-places preferred at Pioneer Bivouac were lacking, but Anophelines [see next abstract] occurred in abundance. The conclusion reached was that *A. punctulatus* is a forest mosquito ; it is remarkable that this forest species does not avoid open, sunny places, but actually gathers there. The clearing around Pioneer Bivouac was not a protection but an attraction.

Notes on the markings of the proboscis and palpi are tabulated, and attention is drawn to their uselessness for differentiating *A. punctulatus* and *A. punctulatus* (*annulipes*) var. *moluccensis*.

DE ROOK (H.). **Specieel Anophelinen-onderzoek. (Uit de geneeskundige verslagen der wetenschappelijke Centraal Nieuw-Guinea Expeditie 1920–1922.)** [Specific Investigation of Anophelines. (From the Health Reports of the Scientific Central New Guinea Expedition of 1920–1922.)]—*Geneesk. Tijdschr. Ned.-Indië*, lxiv, no. 4, pp. 642–656, 1 pl. Batavia, 1924.

A detailed description is given of the characters of *Anopheles punctulatus*, Dön., and *A. punctulatus* var. *moluccensis*, Sw. The former predominated at Pioneer Bivouac with numerous breeding-places in open ground, while the latter was the sole Anopheline at Prauwen Bivouac [see preceding abstract]. It is evidently responsible for the malaria there, and its conviction as a carrier of malaria is a matter of importance for malaria control in the eastern portion of the Malay Archipelago, where it is the predominant Anopheline. Both *A. punctulatus*, Dön., and *A. punctulatus* var. *moluccensis*, Sw., must be kept distinct from *A. tessellatus*, Theo., which occurs in the west of the Archipelago.

FRANÇA (C.). **Recherches sur les plantes carnivores. II.** *Utricularia vulgaris*.—*Bol. Soc. Broteriana*, i (2nd Ser.), pt. 1, pp. 11–37, 9 figs. Coimbra, April 1922. [Received 20th October 1924.]

Utricularia vulgaris is an aquatic plant that floats near the surface of the water during the warm months of the year ; it has no roots, but attached to the leaves are small " bladders," which are the means by which the plant obtains most of its nitrogenous food, being, in effect, highly specialised traps for capturing small water animals. The morphology and biology of the plant are carefully described, particular attention being given to the bladders and the absorption of the animal proteids by specially adapted cells within them.

In an appendix the author draws attention to the use of aquatic plants in mosquito control, in view of the necessity for the employment of every possible means in anti-malarial measures.

The plants useful for this purpose fall into two classes : first those that prevent the development of the larvae by covering the surface of the water so thickly as to prevent their breathing ; secondly those that actively kill the larvae.

To the first class belong the Lemnaceae, the use of which was suggested in New Jersey by H. P. Johnson in 1902. *Lemna minor* was used by Adie in India, and subsequently other investigators in India recommended *Lemna* and *Wolffia*, and also *Azolla*. Neiva & Penna, however, in Brazil, found that *Wolffia*, and *Azolla* even more so, failed to form continuous masses. In the author's opinion *Azolla* should be

widely used; in Portugal *A. caroliana* and *A. filiculoides* cover the surface of sluggish streams, leaving only occasional open spaces. The latter species is especially valuable; of two adjacent ponds, one was covered with *A. filiculoides*, and in it not a single mosquito larva could be found, while the other, from which the plant was absent, swarmed with Culicine and Anopheline larvae.

To the second class belong the aquatic carnivorous plants. Martzinovski [*R. A. E.*, B, v, 85] mentioned the properties of *Utricularia vulgaris* in connection with mosquito control in 1916. In a pond in the author's garden *U. vulgaris* captured numerous larvae of *Theobaldia longiareolata* (*spathipalpis*) and *Anopheles bifurcatus*. The plant grows rapidly during the warm weather, and its bladders are able to capture mosquito larvae of all stages, the smallest capturing larvae that have just hatched, while the fully developed bladders are able to seize full-grown larvae. Another plant of this class is *Aldrovanda*.

The author considers that the diffusion of these carnivorous plants, even more than those of the first class, should be attempted.

Rivet (L.). **Utilisation des tritons pour la destruction des moustiques.**— *Presse méd.*, xxxi, no. 62, pp. 1296–1297. Paris, 4th August 1923.

This is a résumé of a paper by Sergent & Foot already noticed [*R. A. E.*, B, xi, 172] on the value of newts in the control of mosquito larvae.

Garofolini (L.). **L'utilizzazione del *Triton cristatus* per la distruzione delle larve di anofele.** [The Use of *T. cristatus* for the Destruction of Anopheline Larvae.]— *Atti R. Accad. Naz. Lincei*, Rendiconti, Sci. fis., mat. e nat., xxxiii, 2nd Sem. no. 3–4, pp. 129–131. Rome, 1924.

Experiments were made by the author to check the observations of Sergent & Foot on the value of newts as destroyers of mosquito larvae [*R. A. E.*, B, xi, 172]. *Triton cristatus* preys upon Anopheline larvae simply because its voracity causes it to prey on any moving object within reach. In a pond containing Crustacea, which are more easily captured than mosquito larvae, its value in destroying the latter is largely discounted. In 1913 Grassi found oiling to be necessary for a pond where newts abounded.

Sergent (Ed. & Et.), Parrot (L.), Foley (H.), Sénevet (G.) & Catanei (A.). **Études épidémiologiques et prophylactiques du paludisme 20e, 21e et 22e Campagnes en Algérie en 1921, 1922 et 1923.**— *Ann. Inst. Pasteur*, xxxviii, no. 9, pp. 775–786. Paris, September 1924.

In Algeria the occurrence of malaria stands in direct relation to the severity of the spring rains, the second great factor being the temporary migration of disease carriers, such as agricultural workers. By a study of the spring rainfall the intensity and extension of malaria during the following summer may be predicted. The same conditions are favourable for the cultivation of cereals, so that, as the natives say, a year of good crops is a year of fever. The artificial reservoirs for the irrigation of the cultivated areas are particularly dangerous from the

point of view of mosquito breeding, as *Anopheles maculipennis* may be found in them from May to the end of September in far greater numbers than in any of the neighbouring natural breeding-places, which are mostly only temporary. Although all the conditions indicated as the most favourable for the adaptation of Anophelines to animal hosts are present in Algeria, these animal hosts do not appear to be of any value in protecting man. Anophelines are found in greater numbers in stables, etc., than in human dwellings because of their humidity, darkness and ease of access. Any place combining these conditions will be equally attractive, even without the presence of animals. The general prophylactic measures adopted are briefly outlined, and the importance of maintaining even the minor anti-larval measures is pointed out. In one locality where such measures were suspended for a month, numerous cases of malaria broke out.

Metalnikov (S.). **Phagocytose et réactions des cellules dans l'immunité.**— *Ann. Inst. Pasteur.*, xxxviii, no. 9, pp. 787–826, 18 figs. Paris, September 1924.

The question of phagocytosis and cellular reactions in the immunity of *Galleria mellonella* from various virulent bacteria is dealt with at length.

Glaser (R. W.). **A Bacterial Disease of Adult House Flies.**—*Amer. Jl. Hygiene*, iv, no. 5, pp. 411–415, 1 pl. Baltimore, Md., September 1924.

Staphylococcus muscae, sp. n., is described, this being the first bacterial disease of adult house-flies that has been discovered. The disease is sporadic in its appearance and never becomes epidemic. In experiments, about 50 per cent. of adult flies became infected by feeding on the abdominal fluid from diseased individuals or on a bouillon culture or aqueous suspension of the bacterium from an agar slant. Males were more susceptible than females. The period from infection to death varied from 7 to 29 days, with an average of 16. As the preoviposition period of *Musca domestica* has previously been shown to vary from 11 to 24 days, with an average of 15 days, it is probable that in the above experiments most of the flies must have matured sexually and most of the females must have oviposited before dying. In many instances this was observed to be the case, and therefore the possibility of using this organism in control of the fly seems remote. The characters distinguishing it are described.

Root (F. M.). **Notes on the Mosquitoes of Lee County, Georgia.**— *Amer. Jl. Hygiene*, iv, no. 5, pp. 449–455. Baltimore, Md., September 1924.

As the result of a study of the mosquito fauna of Lee County, Georgia, in 1923 a list of the mosquitos found is given, with notes on their breeding-places. The list includes three Anophelines. *Anopheles punctipennis*, Say, which bred in streams, wells and deep lime sinks, was not very common. *Anopheles quadrimaculatus*, Say, which bred in ponds and swamps, became very common during the summer, its rise coinciding fairly well with the onset of the real malaria season in Lee County. Of 415 females of this species, caught mainly in and under houses, 13 showed well developed oocysts in the stomach, while one,

with the stomach negative, showed the salivary glands filled with sporozoites. It seems probable that this is the chief malaria carrier of the region. *A. crucians*, Wied., which is very abundant in spring and autumn, apparently has two races, breeding in brackish and fresh water respectively, and these can be differentiated in the larval stage, though no difference can be detected in the adults.

Practically all the permanent and semi-permanent pieces of water are densely populated by *Gambusia*, and the abundance of Anopheline larvae seems to depend directly on the amount of shelter provided by aquatic vegetation.

ROOT (F. M.). **Further Notes on the Male Genitalia of American** *Anopheles*.—*Amer. Jl. Hygiene*, iv, no. 5, pp. 456–465, 3 pls. Baltimore, Md., September 1924.

Some errors in a previous paper on this subject [*R. A. E.*, B, xi, 206] are corrected, and some further details are given regarding the *Arribalzagia* and *Nyssorhynchus* groups. The descriptions of *Anopheles walkeri*, Theo., and *A. pseudopunctipennis*, Theo., are revised. The individual described as *A. lutzi*, Cruz, evidently belongs, not to this species, nor to any member of the *Myzorhynchella* group, but to some species of the *Nyssorhynchus* group very close to, and perhaps identical with, *A. braziliensis*, Chagas. The male genitalia of the *Myzorhynchus* group therefore remain undescribed. The classification of the *Arribalzagia* group is discussed, the author including in it, in addition to the species listed by Dyar [*R. A. E.*, B, vii, 23], *A. vestitipennis*, D. & K., and probably the recently described *A. amazonicus*, Christophers. Two other South American Anophelines that show some features in common with the *Arribalzagia* group, though they are decidedly divergent in some other respects, are *A. annulipalpis*, Lynch, and *A. peryassui*, D. & K. (*Manguinhosia lutzi*, Cruz). The genitalia of these species have not been described, and until they are known it is inadvisable to attempt to determine their exact relationships. *A. grabhami*, Theo., is discussed in relation to the *Arribalzagia* group; a consideration of the characteristics of this species indicates that it represents a stage intermediate between such a species as *A. punctipennis*, Say, and the *Arribalzagia* group. Descriptions of the male genitalia of *A. pseudomaculipes*, Chagas, and *A. intermedius*, Chagas, are given in an appendix.

In the *Nyssorhynchus* group, further study has confirmed that *A. albimanus*, Wied., and *A. tarsimaculatus*, Goeldi, are distinct species, the latter of which may occasionally assume the coloration of the palpi usual in the former. While the exact distribution of these species will have to be worked out anew on the basis of apparently constant differences in the genitalia, it seems likely that the distribution is correctly stated in the monograph of Howard, Dyar & Knab. It is expected that Brazilian individuals of *A. albimanus* will prove to be aberrations of *A. tarsimaculatus*. In recent years a number of new species belonging to the *Nyssorhynchus* group have been described by Brazilian authors, these being generally placed in the genus *Cellia*. The author can find no differences in the genitalia between *A. allopha*, Lutz & Peryassu, and *A. argyritarsis*, R.-D., nor between *A. oswaldoi*, Peryassu, and *A. tarsimaculatus*. It seems logical, therefore, to relegate these two names to the synonymy of *A. argyritarsis* and *A. tarsimaculatus* respectively.

BRUMPT (E.). **Au sujet du rôle pathogène de l'*Argas persicus*.**—*Rev. Hist. nat. appl.*, Ière partie, v, no. 7, pp. 209–220, 3 figs. Paris, July 1924.

Argas persicus is the greatest enemy of poultry keeping, causing direct loss by infection, intoxication and deterioration of the birds, and indirect loss by decreasing the laying capacity of hens and by forcing sitting hens to leave their nests. The geographical distribution of the tick is given, and its importance as the vector of different forms of spirochaetosis is explained. This disease occurs wherever *A. persicus* is present and conditions are favourable for its development. The present distribution of the disease so far as known is explained, as well as its varying nature [*R.A.E.*, B, ix, 150]. Authors are not quite agreed as to whether the forms of spirochaetosis observed in diseased birds in different parts of the world are identical or not ; the arguments for each side are briefly stated, but it is found that while in certain cases a known virus confers immunity against another the converse does not occur, rather indicating that the one is a stronger virus than the other and not a different species. The author gives a list of the forms recorded as causing spirochaetosis of birds. *Spirochaeta* (*Treponema*) *anserinum* infests fowls, ducks and geese, its normal vector being *A. persicus*. *S.* (*T.*) *gallinarum* (*marchouxi, granulosa penetrans, gallinarum* var. *hereditaria*), the geographical distribution of which is related to that of *A. persicus*, but which has also been transmitted experimentally by *Ornithodorus moubata* and *A. reflexus*, infests fowls, ducks, geese, pigeons, sparrows, etc., and may possibly be identical with *S. anserinum*, while *S.* (*T.*) *neveuxi* and *S.* (*T.*) *nicollei* are perhaps only biological races of it, both being transmitted by *A. persicus* to fowls and *S. nicollei* also to geese. *S.* (*T.*) *lagopodis* is found in England in red grouse harbouring nymphs of *Ixodes ricinus* with spirochaetes in the digestive tract, so that *I. ricinus* may be the vector of this organism. *S.* (*T.*) *anatis* has been found in ducks in Hungary, Egypt and North Africa.

It is possible to prevent the introduction of *A. persicus* into poultry-yards, provided that all birds brought in are first quarantined for 15 days in wire-netting cages standing over a bath of water covered with a thin film of kerosene. The larvae present on the birds will drop off and be destroyed before the birds are liberated. The chicken houses should be constructed of metal so that they can be easily cleaned or passed over with a blow-lamp. When home-made wooden houses become heavily infested, it is best to burn them and put the birds into quarantine or bathe them in insecticide solution and then construct fresh houses. A good plan is to suspend the roosts by wire from the ceiling, thus avoiding all contact with the walls. When an outbreak of spirochaetosis occurs, if treated in time with arsenical substances the birds may recover ; the relative merits of some of these drugs are discussed.

KNIBBS (Sir G. H.). **Agricultural and pastoral Industries.**—*1st Ann. Rept. Inst. Sci. & Indust., 1921–22*, pp. 10–22. Melbourne, 31st July 1922. [Received 22nd September 1924.]

A brief account is given of the various investigations undertaken by the Institute, including sheep blow-flies, cattle ticks, and worm nodule disease in cattle.

MacDougall (R. S.). **On the Distribution of the Ox Warble Flies (*Hypoderma bovis* and *Hypoderma lineatum*) in Scotland.**—*Scot. Nat.*, no. 147, pp. 85–88. Edinburgh, May–June 1924.

Hypoderma lineatum is found in Scotland rather earlier than *H. bovis*, no last-stage larvae of the latter having been observed before 6th April in the course of the present investigation ; and not until the end of the month was this species found in larger numbers than *H. lineatum*. No last-stage larvae of *H. lineatum* were found after 23rd May. The larvae of these flies may be obtained from the skin of cattle all the year round, but at certain times of the year (August–December) they can only be observed in the hides of slaughtered animals.

Examination of the first Canadian cattle to reach Scotland after the removal of the import restrictions in 1923 revealed larvae of both species.

Mathiesen, Poels & Dahlgrün. **Viehverluste in den Niederungen der Leine und Aller durch Stiche der Kriebelmücke.** [Cattle Losses in the Lowlands of the Leine and Aller due to the Bites of Simuliids.]—*B.t.W.*, 1924, p. 271. (Abstract in *Deutsche Tierärztl. Wochenschr.*, xxxii, no. 38, pp. 570–571. Hanover, 20th September 1924.)

The Simuliid responsible for injury to cattle in the districts of the Leine and Aller rivers is *Simulium argyreatum*, Meig. ; *S. lineatum*, Meig., which is common on the river above Hanover, does not appear to be harmful. The males do not wander far from rivers, but the females may travel 6 miles or more. A rapid fall of the water-level has been thought to result in the emergence of large numbers, because the pupae on aquatic plants are thus left dry. Observations in the aquarium, however, show that emergence under water is possible, the adult flying away on reaching the surface, though adults do emerge more quickly from dry pupae than from those under water. Wet and cold weather destroys almost all the Simuliids present. Normally there is a spring, a summer and an autumn generation.

The authors have been unable to find a practical remedy. The clearing of vegetation on the river banks is an enormous undertaking. Perhaps the best method is to limit pasturing and to put out cattle to pasture at an early date in order that they may acquire a certain degree of resistance.

Hutchins (E.). **Diseases of Cattle.**—*Uganda Protectorate* : *Ann. Rept. Vet. Dept. 1923*, pp. 4–10. Entebbe, 1924.

In the new areas of infection with African coast fever recorded in 1921 [*R. A. E.*, B, xi, 146] there has been a marked increase of the brown tick [*Rhipicephalus appendiculatus*] and the area of infection has gradually extended, the number of deaths being heavy. *Glossina pallidipes* is recorded from some localities where it has not hitherto been known to occur, including Kibale, where an outbreak of trypanosomiasis among cattle was reported. In Ankole, however, a very marked reduction in the numbers of *G. morsitans* was observable ; trypanosomiasis was found in a few localities. Outbreaks of the disease in cattle in Buganda and the Western Provinces during the

past 15 years in supposed tsetse-free country appear to indicate that in certain localities *Glossina* is almost constantly present, or recurs from year to year.

RICHARDSON (U. F.). **Report of the Veterinary Pathologist for the Year 1923.**—*Uganda Protectorate*: *Ann. Rept. Vet. Dept. 1923*, pp. 11–14. Entebbe, 1924.

Inconclusive experiments with *Trypanosoma congolense* and *T. vivax* are reported upon; the indications were that infection of cattle with the latter does not result in a serious disease. In June an attempt was made to transmit both organisms by interrupted feeding of *Stomoxys*, 100 flies being used. Feeding continued for 10 and 18 days respectively, but in both cases the results were negative.

CURSON (H. H.). **Blowfly of Sheep and allied Conditions affecting Stock, or "Calliphorine Myiasis" in Domesticated Animals.**—*Jl. Dept. Agric. Union S. Africa*, ix, no. 3, pp. 266–274. Pretoria, September 1924.

An account is given of myiasis due to Calliphorine flies in domestic animals. The genera *Calliphora* and *Auchmeromyia* are not yet known to infest domestic animals in South Africa, the flies responsible for primary myiasis in sheep being *Chrysomyia chloropyga*, *C. albiceps* and *Lucilia sericata*, all of which, as well as *C. marginalis* and *C. bezziana*, also infest wounds in sheep, cattle, etc. Notes are given on these blowflies and on others from various parts of the world, with a brief general review of their life-history and the symptoms produced. Preventive treatment and remedial measures are discussed. Myiasis of the dog, caused by *Cordylobia anthropophaga*, is also described.

FRIESICKE (P.). [**L'azione del "Sulfoliquid" sugli ectoparassiti.**] [The Action of "Sulfoliquid" on Ectoparasites.]—*Arch. f. wiss. u. prak. Tierhk.*, 1923, p. 90. (Abstract in *Clinica vet.*, xlvii, no. 9, pp. 567–570. Milan, September 1924.)

Sulfoliquid is a proprietary preparation containing sulphurous acid in a viscous medium. It was experimentally effective against a large number of ectoparasites, including ticks, lice, mites, *Cimex lectularius* and fleas. It affects the skin less than sulphur dioxide and acts for 15–20 minutes. If warmed to 30°–40° C. [86°–104° F.], its insecticidal properties are enhanced. The animals treated are not injured, though the respiratory organs may sometimes be slightly affected.

CATONI (L. A.). **Plagas de insectos que atacan á los animales domésticos.** [Insect Pests that attack Domestic Animals.]—*Rev. Agric. Puerto Rico*, x, no. 3, pp. 35–39. San Juan, P.R., March 1923. [Received 10th October 1924.]

Brief notes are given on the following parasites of domestic animals and poultry in Porto Rico and on the measures against them: the Diptera, *Cochliomyia* (*Compsomyia*) *macellaria*, *Cephalomyia* (*Oestrus*) *ovis*, *Oestrus* (*Gastrophilus*) *equi*, *Hypoderma lineatum* and *H. bovis*; the lice, *Menopon pallidum* and *Haematopinus suis*; the flea, *Tunga* (*Pulex*) *penetrans*; and the mite, *Dermanyssus gallinae*.

GILBERT (S. J.). **A Case of *Theileria mutans* Infection (Egyptian Fever) in Palestine.**—*Jl. Comp. Path. & Therap.*, xxxvii, pt. 3, pp. 158–160, 1 fig. London, 30th September 1924.

A case of infection with *Theileria mutans* is described in a Holland bull born in Palestine. The surrounding country had previously been found to be tick-infested, and *P[iroplasma] bigeminum* and *Anaplasma marginale* had been identified as a cause of tick disease in imported cattle there. The chief ticks as yet recorded in the locality are *Boophilus annulatus* and *Hyalomma aegyptium.*

WARE (F.). **A Case of Habronemiasis in England.**—*Jl. Comp. Path. & Therap.*, xxxvii, pt. 3, pp. 160–162. London, 30th September 1924.

Apparently only one case in England of infection by *Habronema microstoma* in the horse has previously been recorded. The author gives details of a case in which the infection was undoubtedly contracted in this country, the animal in question having spent its life entirely between Liverpool and Newmarket. The horse was destroyed on account of its debilitated condition, and *post-mortem* examination revealed a number of *H. microstoma* in the stomach. It is a rather remarkable fact that although the other species of *Habronema* infesting horses, *H. megastoma* and *H. muscae*, are transmitted by the common house-fly (*Musca domestica*), *H. microstoma*, which requires *Stomoxys calcitrans* for its complete life-cycle, should be the only species as yet recorded from Great Britain.

LAAKE (E. W.). U.S. Bur. Ent. **Further Observations on the Moults of the Ox Bots *Hypoderma bovis* De Geer and *H. lineatum* Villers.**—*Jl. Agric. Res.*, xxviii, no. 3, pp. 271–274. Washington, D.C., 19th April 1924. [Received 16th October 1924.]

The conclusion that there are five stages, or four moults, in the larvae of *Hypoderma lineatum*, Vill., and probably the same number in *H. bovis*, DeG. [*R. A. E.*, B, ix, 171], has been generally accepted, though some entomologists maintain that there are only three stages, or two moults, in Oestrids, as well as in other Diptera. This paper presents further facts substantiating the claim that there are five larval stages in these two species.

HOUCHIN (E. N.). *Hypoderma* **in Teat of Cow.**—*Jl. Amer. Vet. Med. Assoc.*, lxvi, no. 1, p. 106. Detroit, Mich., October 1924.

In the case recorded a larva of *Hypoderma lineatum* was obtained from the teat canal of a cow, showing how widely this parasite may be distributed throughout the body.

NEWSTEAD (R.), EVANS (A. M.) & POTTS (W. H.). **Guide to the Study of Tsetse-flies.**—*Liverpool Sch. Trop. Med.*, Mem. (N.S.) no. 1, Imp. 8vo, xi & 332 pp., 28 pls., 59 figs., 4 maps. Liverpool Univ. Press; London, Hodder & Stoughton, Ltd., 1924. Price 20*s.*

This work deals in a most comprehensive manner with the classification, morphology and bionomics of the known species of *Glossina*. A general account is given of the life-cycle of tsetse-flies and of the

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reproductive and alimentary systems. The characters of the genus are discussed, with a description of the male and female genital armature on which its classification is based. The genus is divided into the *fusca*, *palpalis* and *morsitans* groups, and a key to the species of each group is given.

The number treated as of specific rank is twenty, with one subspecies and five varieties. Each is dealt with individually, and is fully described, with an illustrated account of the structure of its genital armature and, where possible, with a review of its biology and distribution, largely taken from the literature. The sources from which the information has been obtained are in all cases referred to in the text, and the titles of the works are given in an extensive bibliography. A short chapter is devoted to the preparation of material for the microscopical study of structural and histological features.

Most of the very numerous illustrations are from original drawings or photographs.

CARPENTER (G. D. H.). **Report of Senior Medical Officer i/c Sleeping Sickness for 1923.**—*Uganda Protectorate: Ann. Med. & Sanit. Rept. 1923*, pp. 73–74. Entebbe, 1924.

The situation with regard to sleeping sickness in Uganda in 1923 leads the author to conclude that special administrative officers must be appointed in various districts if treatment of the disease is to be properly carried out, clearings supervised and regulations enforced. Treatment is considered an important factor, as curing the disease will result in sterilising the blood of infected individuals so that they cease to infect *Glossina*.

LETHEM (W. A.). **The Epidemiology of Bubonic Plague in Great Britain, with special Reference to its Spread by** *Pulex irritans*.—*Jl. State Med.*, xxxi, no. 11, pp. 508–511. London, November 1923.

The author contends that in Britain and cold countries generally, primary infection with plague is due to the rat flea, *Ceratophyllus fasciatus*, but that the disease is spread directly from man to man by the human flea, *Pulex irritans* [*cf. R. A. E.*, B, xii, 36]. In all outbreaks recently recorded in Britain the first case has been usually connected with a rag store, a grain warehouse, or with docks. Subsequent cases have occurred in rapid succession in the house where the first was treated. After the infection of the members of the household, the outbreak stops. A similar outbreak in the neighbourhood can usually be traced to a definite connection with the first one, such as visits or by the receipt of clothing.

Ceratophyllus fasciatus, the common rat flea of cold climates, is not so successful a plague carrier as the tropical rat flea, *Xenopsylla cheopis*, nor does it bite man so readily. The preference of *C. fasciatus* for the nest and not for the rat itself may explain why the first case of an epidemic is so often connected with a rag store, where nests are often found. Owing to its ability to resist cold, it does not at once leave the dead body of a rat, and when it does, it is merely to move to a neighbouring nest. It is a parasite of the brown rat, *Mus norvegicus*, which lives mostly out of doors or underground and is particularly afraid of man. Man, therefore, rarely comes in contact with *C. fasciatus*.

This contrast with the facility of contact with *X. cheopis* may account for the scarcity of plague in Britain ; but the fact that, when a case has occurred, the disease tends to affect a single household, and those in most intimate contact with the patient are the first to be infected, seems to indicate that the human flea, *Pulex irritans*, is responsible for its spread. If this is the case, the sudden stoppage of the epidemics is due to the short period (a matter of a few days, it is believed) for which this flea remains infectious. *P. irritans* dies at temperatures above 85°F., and this may explain the small part played by it in Indian epidemics.

PURDY (J. S.). **The Rat and Flea Problem in the Prevention of Plague.** —*Jl. R. Sanit. Inst.*, xliv, no. 11, pp. 438–450. London, April 1924.

This paper includes a survey of the facts relating to rats and fleas, mostly in connection with anti-plague work at Sydney, where nine outbreaks have occurred since 1900. Practical advice on tested methods of trapping is given. During the outbreak of plague at Sydney in 1921–1922 considerable success in ridding premises of fleas attended the spraying of an emulsion of 82 parts kerosene, 15 parts liquid soap and 3 parts water.

PETRIE (G. F.) & TODD (R. E.). **A Report on Plague Investigations in Egypt.**—*Min. Interior : Dept. Public Health.* Cairo, 1923. (Reviewed in *Brit. Med. Jl.*, no. 3300, pp. 582–584. London, 29th March 1924.)

This report on the essential features of plague in Egypt during the last 25 years is divided into eight sections, dealing respectively with the general history of the disease, rodents and fleas, local migrations of rodents, a study of some local outbreaks, factors of seasonal prevalence, various aspects of the epidemiology of bubonic plague in Egypt, epidemiology of pneumonic plague, and prophylaxis, and includes maps, charts and numerous tables.

Mus rattus is the important house-infesting rodent in Upper Egypt, though *Acomys cahirinus* is also common in houses. *M. norvegicus* has only a sparse distribution in Upper Egypt, though it is the species most often trapped in boats on the Nile. *Arvicanthis niloticus*, the common field rat, is occasionally trapped in houses.

Xenopsylla cheopis is the flea chiefly found on all these rodents. A systematic examination of rats in Asyût town, showed that there is a definite seasonal wave of prevalance for fleas captured from both *M. rattus* and *A. cahirinus*, the flea curves corresponding well with that of epidemic plague in the district. *A. cahirinus* carries few fleas, and is therefore of little importance in spreading the infection.

The mud-houses of infected villages in local outbreaks proved to be infested with rat-fleas to an extraordinary degree, and efforts made to reduce their numbers were quite ineffective.

As regards factors of seasonal prevalence, the extent of the disease at any moment in the epidemic period is determined, not by the strictly contemporaneous weather conditions, but by those which existed four to six weeks previously. The interval is attributable to the influence of atmospheric conditions on the various stages of development of *X. cheopis*. There is an optimum range of temperature of from 20 to 25°C. [68–77°F.] and of vapour pressure deficiency of from 1 to 10

millibars for plague prevalence. The degree in which the climate of an infected locality approximates to the optimum determines to a definite extent the normal character of its plague history. The gradually increasing delay in the onset of epidemic plague, from south to north of Egypt, is correlated with the seasonal variations in the climate throughout the country. These act by influencing the rat-flea and consequently the prevalence of rat plague.

The freedom of Cairo from plague since 1899, in spite of exposure to attack owing to its situation between Upper Egypt and the Delta, is associated with an unusually low rat infestation of the native houses.

CHAVIGNY (P.). **Les animaux parasites de l'homme et de l'habitation.**— 16°, iv+407 pp., 25 figs. Paris, Gaston Doin, 1924. Price *Frs.* 10.

This book deals with rats and mice, lice, fleas, bedbugs, *Musca domestica* and other flies, mosquitos, various mites, cockroaches, ants and several of the intestinal parasites of man. A popular but thoroughly practical account is given of their importance, bionomics and control. Particular attention is devoted to rats and to *Pediculus humanus*, and the experience gained concerning them in the late war is discussed.

GIORDANO (M.). **Osservazioni sopra una piccola epidemia di Dengue.** [Observations on a slight Epidemic of Dengue.]—*Ann. Med. navale e colon.*, xxx (I), no. 5–6, pp. 220–231. Rome, May–June 1924.

A slight epidemic of dengue occurred on Italian war vessels in the Red Sea. The most effective prophylaxis was afforded by the departure of the vessel from port or by a change of anchorage to a distance from land and to windward of it. Possibly either a species of *Culex* or of *Phlebotomus* may have been the vector, the latter being thought the more probable.

WHITTINGHAM (H. E.). **The Etiology of** *Phlebotomus* **Fever.**— *Jl. State Med.*, xxxii, no. 10, pp. 461–469. London, October 1924.

This is a survey of existing knowledge of the aetiology of sand-fly fever, showing that *Phlebotomus papatasii* is the insect vector.

GOODWIN (E. St. G. S.). **The Cockroach. 1. Considered as a possible Disseminator of Disease. 2. Methods of Eradication.**— *Jl. State Med.*, xxxii, no. 10, pp. 470–478. London, October 1924.

This paper aims at drawing attention to the possibilities of harm by the cockroaches, *Blatta orientalis*, *Blattella* (*B.*) *germanica* and *Periplaneta americana*.

In the chapter on eradication the author states that in his opinion the success of sulphur dioxide fumigation with the Clayton apparatus lies in carrying out three fumigations at suitable intervals.

HALL (M. C.). **Lesions due to the Bite of the Wheel-bug,** *Arilus cristatus* **(Hemiptera ; Reduviidae).**— *Arch. Internal. Med.*, xxxiii, no. 4, pp. 513–515. Chicago, Ill., 15th April 1924.

The case reported is one in which a wheel-bug, *Arilus cristatus*, bit the hand of its captor twice rapidly in succession. In a few days,

growths resembling papillomata developed at the sites of the punctures and persisted for months. These seem to indicate the action of some toxin.

LESSA (G.). **A epidemiologia da molestia de Chagas.** [The Epidemiology of Chagas' Disease.]—*Boletim Sanitario*, ii, no. 3, pp. 1–27. Rio de Janeiro, August 1923.

Schizotrypanum cruzi has been found to occur in a number of Arthropods in South America. They comprise the bloodsucking bugs, *Triatoma megista* (the most common vector in Brazil), *T. infestans*, *T. geniculata*, *T. chagasi*, *T. sordida*, *T. vitticeps*, *T. dimidiata* var. *maculipennis*, *T. rubrovaria*, *T. brasiliensis*, *Rhodnius prolixus*, *R. pictipes* and *Eratyrus cuspidatus*, and two ticks, *Amblyomma cayennense* and *Rhipicephalus sanguineus*.

FELT (E. P.). *Wohlfartia vigil*, **Walker, attacking Man.**—*Jl. Econ. Ent.*, xvii, no. 5, p. 603. Geneva, N.Y., October 1924.

A first stage larva, presumably *Wohlfahrtia vigil*, Wlk., has been taken from the conjunctiva of a man in New York. This appears to be the first American record of infestation of the eye in an adult, such as is recorded for the European *W. magnifica*. Infestation is presumably most likely to occur in heavy sleepers, especially young children.

PHELPS (J. R.). **Eradication of Vermin on Board Ship.**—*U.S. Naval Med. Bull.*, xx, no. 2, pp. 247–268. Washington, D.C., February 1924.

This is an account of the various methods of eradicating vermin on board ship. Much of the information has been adapted from previous publications on bedbugs and cockroaches [*R. A.E.*, B, iii, 126; v, 48].

STOCK (P. G.). **Some Considerations on the Use of Hydrogen Cyanide and Allied Substances with Special Reference to International Preventive Medicine.**—*Proc. R. Soc. Med.* (Sect. Epidem. & State Med.), xvii, no. 4, pp. 9–27, 17 figs. London, February 1924.

The various methods for fumigation with hydrocyanic acid gas are described [*cf. R. A.E.*, B, xii, 88].

[GALKOV (V. P.).] **Гальковъ (В. П.). фумигаціа, (окуриваніе) ціанистымъ водородомъ, какъ мѣра борьбы съ насѣкомыми-паразитами человѣка.** [Fumigation with Hydrocyanic Acid for the Control of Insect Parasites of Man.]—**Народн. Комиссар. Здравоохраненія. Чрезвычайная Комисс. по борьбѣ съ сыпнымъ тифомъ.** [*Nat. Commiss. Health Protect. Extraordinary Commiss. Control Typhus*], 40 pp., 6 pls. Kharkov, 1919. [Received 11th November 1924.]

Various methods of disinfecting clothing and buildings infested with lice and other vermin are discussed, the existing literature being reviewed. The use of hydrocyanic acid gas in this connection is dealt with in some detail.

Ewing (H. E.). **Lice from Human Mummies.**—*Science*, lx, no. 1556, pp. 389–390. Garrison, N.Y., 24th October 1924.

There has long been a difference of opinion as to whether each of the different races of mankind harbours a distinct race of lice. Lice found on the scalps of prehistoric American Indian mummies are quite distinct from what Fahrenholz described as *Pediculus humanus marginatus*, a Japanese form, and are much nearer *P. humanus chinensis*, Fahr. [*R. A. E.*, B, ix, 19], though the author is inclined to doubt the advisability of recognising more than one variety of louse for the yellow race. The mummy lice were found to be quite distinct from the *Pediculus* from American spider-monkeys of the genus *Ateles*.

Blacklock (B.). **Craw-Craw in Sierra Leone.**—*Ann. Trop. Med. & Parasit.*, xviii, no. 3, pp. 253–262, 2 pls. Liverpool, 31st October 1924.

The disease known as craw-craw among the Sierra Leone natives is discussed, and the literature concerning it is reviewed. Recent studies show it to be identical with scabies, the causal agent also being morphologically indistinguishable from *Sarcoptes scabiei*.

Ingram (A.) & Macfie (J. W. S.). **The Mosquitos of Accra.**—*Ann. Trop. Med. & Parasit.*, xviii, no. 3, pp. 263–264. Liverpool, 31st October 1924.

In all 68 species of mosquitos are recorded, the Anophelines being *Anopheles* (*A.*) *mauritianus*, Grp., *A.* (*Myzomyia*) *costalis*, Lw., *A.* (*M.*) *domicolus*, Edw., *A.* (*M.*) *funestus*, Giles, *A.* (*M.*) *marshalli*, Theo., *A.* (*M.*) *pharoensis*, Theo., and *A.* (*M.*) *umbrosus*, Theo. All the species were found within the municipal boundary of Accra, including the town itself, the suburbs and the immediate environs, and two lagoons, but no forest land. The area would not have appeared, therefore, to be exceptionally favourable for the maintenance of a large number of different mosquitos. In spite of the numerous species occurring at Accra, they are not exceptionally troublesome and may be even considered rare in the European quarters.

Ciurea (T.) & Dinulescu (G.). **Ravages causés par la mouche de Goloubatz en Roumanie ; ses attaques contre les animaux et contre l'homme.**—*Ann. Trop. Med. & Parasit.*, xviii, no. 3, pp. 323–342, 3 pls., 1 fig., 1 map. Liverpool, 31st October 1924.

During 1923 an extraordinary invasion by *Simulium columbaczense*, Schönb. (and possibly other species) occurred in Rumania. Jugo-Slavia and Bulgaria were also invaded, but to a less extent. It is believed that the swarms were chiefly transported by wind, though they have been known to follow animals for certain distances. Actually 16,474 domestic animals died as a result of attack by the Simuliids. Almost half this number were cattle, the others including horses, pigs, sheep and goats. The bite is generally only fatal during the first 4 or 5 days after the invasion, which may last 2 or 3 weeks. It is concluded that the surviving animals acquire an immunity, and this hypothesis is upheld by conditions in endemic areas of infection. The flies only attack during the day-time, but they disappear during the hottest part of the day, from about 10 a.m. to 4 p.m. When the bites have

been very severe, animals show great signs of distress and die within a few hours. In other cases they may survive 6 or 7 days, and should they recover the illness is generally over in from 7 to 8 days. *Post-mortem* examinations show congestion and degeneration of the principal viscera, particularly of the heart, liver and kidneys.

Preventive measures consist of the protection of the animals by keeping them in dark stables, etc., during the day, turning them out to pasture and work at night. Stable doors should be protected by a smoke screen. The natives cover the more vulnerable parts of working animals with various mixtures, such as decoctions from the leaves of absinthe, walnut or hazelnut trees, or even tobacco in vinegar or water. Rancid tallow may be applied either alone or in equal proportions with mineral or vegetable tar.

In cases in which man was attacked the symptoms were similar to those in animals, but no fatalities occurred.

Evans (A. M.). **Descriptions of New Mosquitos from South America.**—*Ann. Trop. Med. & Parasit.*, xviii, no. 3, pp. 363–375, 7 figs. Liverpool, 31st October 1924.

The new species described are *Culex* (*Choeroporpa*) *innominatus*, from the River Amazon and Venezuela; *C.* (*C.*) *clarki*, from the River Amazon; *C.* (*C.*) *tovari*, from Venezuela; *C.* (*C.*) *gordoni*, *C.* (*C.*) *manaosensis* and *C.* (*C.*) *thomasi*, from Brazil; and *C. innovator*, from the River Amazon. The latter probably belongs to the closely allied subgenus *Mochlostyrax*.

Ingram (A.) & Macfie (J. W. S.). **Notes on some African Ceratopogoninae. Species of the Genus** *Lasiohelea*.—*Ann. Trop. Med. & Parasit.*, xviii, no. 3, pp. 377–392, 1 pl., 3 figs. Liverpool, 31st October 1924.

A key is given to the genera *Atrichopogon*, *Lasiohelea*, *Microhelea*, *Lepidohelea*, and *Forcipomyia*, and also to the species of *Lasiohelea*, including *L. nigeriae*, sp. n., from Nigeria, and *L. brevitarsata*, sp. n., *L. caliginosa*, sp. n., *L. litoraurea*, sp. n., and *L. inconspicuosa*, sp. n., from the Gold Coast.

Mackenzie (M. D.). **Notes on the Epidemiology of Malaria in South-East Russia.**—*Lancet*, ccv, no. 5232, pp. 1225–1227. London, 8th December 1923.

The observations recorded in this paper were made in 1922–1293, during the widespread epidemic of malaria in regions of South-East Russia where previously malignant tertian was unknown and benign tertian rare, but where these diseases became almost pandemic, up to 90 per cent. of the population being affected in some areas. The effect on the future of Russia may probably prove to be greater than that of the Revolution, as a healthy country with a virile peasantry was transformed into probably the most malarial country of the world, with a threatened degeneration similar to that produced by malaria in ancient Greece. Had all refugees from Turkestan in the autumn of 1922 been quarantined (as was done for cases of cholera and typhus), the infection of the mosquitos could have been prevented.

The epidemic spread steadily throughout the winter, with the thermometer varying from −20°C. to −30°C. [−4°F. to −22°F.] from

November to March. This spread during extreme cold weather appears to be due to the fact that the drinking-water butts, combined with the almost tropical heat of the log-houses of the peasants, offered ideal breeding-places for Anophelines remaining in the huts from the summer. Larvae in the butts and adults in dark corners, could be found throughout the winter. A marked accession to the number of mosquitos occurs after a bundle of firewood has been brought indoors from the marshes. The wood is dripping wet, and remains so for some days, owing to the humid air in the hermetically sealed dwellings, and possibly eggs of certain species laid on the wood in late autumn and protected by the covering of snow, retain their vitality in spite of a temperature of −22°F. There is no evidence, however, that this applies to Anophelines.

KARAMANA (S.). **Les anophèles en Macédoine et les mesures à prendre contre eux.**—*Glasnik* (Bull. du Minist. de l'Hygiène), Belgrade, 1924. (In Serbian with a German Summary.) (Abstract in *Bull. mens. Office Internat. Hyg. Publique*, xvi, no. 6, pp. 804–805. Paris, June 1924.)

In the Serbian portion of Macedonia *Anopheles maculipennis* represents more than 75 per cent. of the Anophelines. It appears at the end of June, reaches its maximum at the end of July and then falls 50 per cent. at the end of August. It is almost always found in closed spaces, preferably stables. This mosquito prefers cattle to man, and is equally abundant in the quarters of horses, cattle and pigs, but less numerous in those of sheep. It is on the wing between sunset and nightfall, and also for a little in the morning.

A. superpictus is an autumnal species that appears at the end of August, attains its maximum in mid-October, and then disappears. Its habits resemble those of *A. maculipennis*, but it is never so common. It is found nearly everywhere in Macedonia.

A. hyrcanus (*sinensis*) was found in early July in the region of Stip. It was very abundant early in September in the rice-fields of Kočane, flying low among the rice ; by October it had disappeared. It is doubtful, at least in Macedonia, whether it hibernates in the adult stage.

A. bifurcatus is very rare, at least below an altitude of about 3,300 feet. It was found at Doiran only.

A. plumbeus (*nigripes*) occurs in the lowlands of Uskub, breeding in tree-holes.

The majority of cases of both benign and malignant tertian malaria are due to *A. maculipennis*, *A. superpictus* and *A. hyrcanus* playing a minor part only.

As regards prophylaxis, use might be made of the fish, *Rhodeus amarus* of Lake Doiran and *Paraphoxinus minutus* and *P. epiroticus* of Lakes Prespa and Ochrida, which destroy all the larvae along the shores of these lakes.

Jaarverslag der Malariacommissie voor Noordholland over 1922. [Annual Report for 1922 of the Malaria Commission for the Province of North Holland.]—Reprint, 26 pp., from *Verslagen en Meded. Volksgezondheid*, March 1923 [*sine loco*].

In 1922 the first Anopheline larvae [*Anopheles maculipennis*] were noticed on 5th May, the 4th May and 29th April being the corresponding

dates for 1920 and 1921 [*R. A. E.*, B, x, 151]. The last mature eggs were found in September, as against November in 1921. Waters that had been pronounced breeding-places in previous years were kept almost free from larvae by applying a fine spray of paraffin. Experimentally it was found that pupae died in a few hours and most of the larvae in 48 hours in a basin one-third of the water-surface of which was covered with a film sprayed in this manner. The surviving larvae died after transference to clean water without oil. It is not, therefore, necessary to cover the whole surface. It takes some days for the larvae to disappear, but fish, which breathe the air dissolved in the water, are not affected by the oil at the surface. Examination of the dead larvae showed that the oil had reached their finest air tubes. Against the adults hibernating indoors, spraying with a 3 per cent. solution of lysol proved satisfactory.

Jaarverslag der Malariacommissie voor Noordholland over 1923. [Annual Report for 1923 of the Malaria Commission for the Province of North Holland.] (Uitgebracht aan den Minister van Arbeid, Handel en Nijverheid.) [Rendered to the Minister of Labour, Commerce & Industry.]—31 pp., [Amsterdam ?] 1924.

According to Dr. Swellengrebel in Holland the percentage of female Anophelines [*Anopheles maculipennis*] found containing blood in the winter months varies from 8 to 14 in barns, 18 to 25 in animal quarters, and 5 to 16 in dwellings. This proves that Anophelines occasionally suck blood in winter and that they pass from place to place, for the uninhabited barns do not afford opportunities for feeding. For destroying larvae paraffin was sprayed on water at the rate of 3·3 or 4 grammes per square metre. This is considered useful, but continuous work is necessary to keep the mosquitos in check. In North Holland, which has so many breeding-places, the winter destruction of the females seems preferable. This measure must be repeated at intervals for the mosquitos reappear in places that have been thoroughly cleared of them. In an experimental tank containing *Chara foetida*, a mosquito [*A. maculipennis*] that gained accidental access to it deposited eggs that ultimately gave rise to adults, thus controverting the view that this plant is noxious to mosquito larvae.

Chalam (B. S.). **First Progress Report of the Campaign against Mosquitoes, Back Bay Reclamation Scheme, Bombay.**—*Indian Med. Gaz.*, lxi, no. 10, pp. 481–487, 2 charts, 2 pls., 1 fig. Calcutta, October 1924.

In order to get a clear idea as to the actual breeding-grounds in the reclamation zone, the whole area was divided for anti-malarial purposes into several sections. From an analysis of the salt content of the water of the breeding-places it was found that Anopheline larvae under natural conditions may occur in salt water even three times more concentrated than sea-water. Details are given of the salt content of the various water samples and the larvae found in them, and the various other places where larvae were found are listed. Four Anophelines were recorded: *Anopheles subpictus*, Grassi (*rossi*, Giles), the commonest species, breeds in almost any collection of water, including brackish water, but prefers rain-water pools; *A. stephensi*, List., was found in association with *A. subpictus* and breeds in fresh and brackish water; *A. culicifacies*,

Giles, breeds in both fresh and brackish water, but is apparently recorded from the latter for the first time ; and *A. vagus*, Dön., the least common species, is also recorded from brackish water. The sequence of rainfall, Anophelines and malaria, as well as the relation of the tide to anti-mosquito work, is discussed.

Soromenho (L.). **Epidemiology of Malaria and Blackwater Fever in Portuguese East Africa between 1901-1920.**—*Med. Jl. S. Africa*, xviii, no. 8, pp. 201–206. Johannesburg, March 1923.

Malaria is the predominant disease in Portuguese East Africa, and is the chief hindrance to European colonisation. The mosquitos concerned are *Anopheles costalis*, Theo., *A. funestus*, Giles, *A. mauritianus*, Grp. (*paludis*, Theo.) and *A. pharoensis*, Theo. *A. costalis*, the most dangerous African species, is the only one of wide distribution and is chiefly responsible. It is especially abundant at the coast. *A. funestus* is common in the upper Zambesi and in the interior of Quelimane. *A. mauritianus* occurs throughout the province and seems to predominate in the Limpopo valley. *A. pharoensis* occurs in the south, in Lourenço Marques, and in the valley of the Limpopo, but always in small numbers.

Edwards (F. W.). **Some Mosquitos from Ovamboland, S. W. Africa, and from the Cape Province.**—*Ann. S. Afr. Mus.*, xix, no. 1, pp. 159–163. Cape Town, March 1924.

A collection of mosquitos from Ovamboland and Cape Province includes three new species, *Aëdes barnardi*, *A. capensis* and *Culex péringueyi* from Cape Province.

Cooling (L. E.). **Report on Mosquito Survey of the Brisbane Metropolitan Area, 1923.**—*Australia Dept. Health*, 43 pp. typescript, 3 maps. May 1923. [Received 21st October 1924.]

The commoner mosquitos found in the Brisbane area in the course of this survey included *Aëdes argenteus*, Poir. (*aegypti*, L.), *Culex fatigans*, Wied. (*quinquefasciatus*, Say), *C. sitiens*, Wied., *Aëdes* (*Ochlerotatus*) *vigilax*, Skuse, *Mucidus alternans*, Westw., and *Anopheles annulipes*, Wlk. Domestic mosquitos do not breed in fresh water marshes and streamlets in the natural state in southern Queensland on account of the larvivorous fish with which they abound. When, however, the activities of the fish are impaired by aquatic vegetation, a few Anopheline larvae (*A. annulipes*) can generally be found, and some of the rarer Culicines. It is during periods of protracted drought, when the natural waters are covered with aquatic vegetation, and particularly with water hyacinth (which is showing a decided increase during recent years in Brisbane) that the maximum amount of Anopheline development is observed. If streamlets become polluted by sewage so that the fish are killed, domestic species of mosquitos are able to breed in them.

An account is also given of a Culicine survey and of the rarer species of mosquitos found, and the breeding-places in each locality are described in detail. Measures are suggested for dealing with the domestic species, including house-to-house inspection, dealing with polluted waters and with the salt-marsh lands. The anti-Anopheline measures consist chiefly of assisting the work of larvivorous fish by

clearing away vegetation from streamlets and fresh-water swamps. A man working with a draghook and a horse can do much towards clearing such waters, particularly of the fresh-water hyacinth.

Brelje (R. von der). **Die Anhangsorgane des weiblichen Geschlechtsganges der Stechmücken (Culicidae).** [Appendages of the internal Genitalia of female Mosquitos.]—*Zool. Anz.*, lxi, no. 3–4, pp. 73–80, 9 figs. Leipzig, 5th October 1924.

The glands of the internal genitalia of female mosquitos in a limited number of genera are here discussed as a basis of a classification that differs in various respects from previously accepted ones.

Moznette (G. F.). **Mosquito Survey of Bamboo Key, Florida.**—*Florida Ent.*, viii, no. 2, pp. 25–28. Gainesville, Fla., September 1924.

Owing to various reports regarding the freedom from mosquitos of Bamboo Key (a small island, about 3 acres in area, situated among the Florida Keys) the author made a survey of the island. Its topography and flora are described. In January no mosquitos were found, but in October, when the island was again visited, many individuals of *Aëdes taeniorhynchus*, the brackish water mosquito, were collected, and the numbers would probably have been greater in the night. Mosquitos do not seem to occur on Bamboo Key so abundantly as on neighbouring islands, probably because it is more wind-swept and its vegetation is less dense and high ; and at times, when the winds for migration are unfavourable, the island may perhaps be comparatively free from mosquitos when the land in the vicinity is infested.

Bonne (C.). **The Larva of** *Aëdes* (*Ochlerotatus*) *eucephaleus* **Dyar and** *Aëdes* (*Ochlerotatus*) *hortator* **Dyar & Knab (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus*, xii, no. 10–12, pp. 169–170. Washington, D.C., October–December 1924.

The larvae of *Aëdes eucephaleus*, Dyar, and *A. hortator*, D. & K., are described from Surinam, where they are found in temporary pools in the woods.

Dyar (H. G.). **The Male of** *Anopheles vestitipennis* **Dyar & Knab (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus*, xii, no. 10–12, p. 171. Washington, D.C., October–December 1924.

The male of *Anopheles vestitipennis*, D. & K., is described from Porto Rico.

Dyar (H. G.). **Note on** *Aëdes aloponotum* **and other Species of its Region (Diptera, Culicidae).**—*Insecutor Inscitiae Menstruus*, xii, no. 10–12, pp. 178–179. Washington, D.C., October-December 1924.

The male and the larva of *Aëdes aloponotum*, Dyar, are described. This species is restricted in distribution, occurring so far as is known only in the Puget Sound region southward to Mount Rainier (British Columbia and Washington). *A. fitchi palustris*, Dyar, is associated with the former throughout its distribution, but extends further

southward to central California and northward to Alaska. *A. aboriginis*, Dyar, coincides with *A. aloponotum* in its southern distribution, but extends further to the north ; it breeds in early snow pools and rarely in dark pools in deep forest, where the emergence is greatly retarded and the larvae are much preyed upon by those of *Eucorethra*. *A. cinereus*, Meig., occurs generally throughout the forested country.

Dyar (H. G.). **The American Forms of** *Aëdes cinereus* **Meigen (Diptera, Culicidae).**— *Insecutor Inscitiae Menstruus*, xii, no. 10–12, pp. 179–180. Washington, D.C., October–December 1924.

The American form of *Aëdes cinereus*, Meig. (originally described as *A. fuscus*, O.S.), differs from the typical European form and should be called *A. cinereus fuscus*, O.S. At about 7,000 feet the species changes in colouration and habits, and for this form the new name *A. cinereus hemiteleus* is suggested.

Dyar (H. G.). **Notes on** *Aëdes ventrovittis* **Dyar (Diptera, Culicidae).**— *Insecutor Inscitiae Menstruus*, xii, no. 10–12, pp. 181–182. Washington, D.C., October–December 1924.

The larva of *Aëdes ventrovittis*, Dyar, of which *A. fisheri*, Dyar, is found to be the male, is discussed. It breeds by preference at high altitudes where the pools are kept filled by direct drainage from melting snow.

Dyar (H. G.). **Some New Mosquitoes from Colombia—ii. (Diptera, Culicidae).**— *Insecutor Inscitiae Menstruus*, xii, no. 10–12, pp. 183–186. Washington, D. C., October–December 1924.

Culex (*Choeroporpa*) *ligator*, Dyar, is now found to be identical with *C.* (*C.*) *sursumptor*, Dyar [*R.A.E.*, B, xii, 167]. *C.* (*C.*) *crybda*, sp.n., and *C.* (*Mochlostyrax*) *colombiensis*, sp n., are described. An improved table for the separation of the species of *Mochlostyrax* by the male hypopygium is given. *C.* (*M.*) *curopinensis*, B.–W. & B. [*R.A.E.*, B, viii, 60] is a synonym of *C.* (*M.*) *pilosus*, D. & K.

Dyar (H. G.) & Shannon (R. C.). **The American Species of** *Uranotaenia* **(Diptera, Culicidae).**— *Insecutor Inscitiae Menstruus*, xii, no. 10–12, pp. 187–192. Washington, D.C., October–December 1924.

A table is given for the separation of the known species of *Uranotaenia* occurring in America, with notes on their synonymy. *U. syntheta*, sp.n., is described from a female taken in Texas.

Jenkins (J. R. W.). **Observations on the Life History of Tapeworms of the Genus** *Moniezia*.— *Ann. App. Biol.*, xi, no. 3–4, pp. 339–348, 1 pl. Cambridge, October 1924.

A study has been made of the life-histories of tapeworms of the genus *Moniezia* commonly parasitic upon lambs in the Aberystwyth district, including an attempt to determine the manner of infection, presupposing the existence of an intermediate host. Observations recorded seem to refute the theories that infection occurs through the ewe, or that a milk diet is essential for the development of the

larval form of the worm. In a survey of 34 infected farms, the only possible intermediate hosts discovered were slugs, dung beetles and dung-living Staphylinids and mites, all of which live under the best possible conditions for the ingestion of tapeworm eggs. Worms of all ages are found in very young lambs, and practically all the lambs in an infected flock are infected, indicating that the intermediate host must be a commonly occurring species. As slugs and dung beetles, including *Onthophagus nuchicornis*, *Aphodius fossor*, *A. fimetarius*, *A. merdarius* and *A. haemorrhoidalis*, are the commonest of the pasture-living forms at lambing time, attention was confined to these two groups, and the slugs and each species of dung beetle were fed with mature proglottides, which they ate with avidity, but the results were entirely negative. The sheep ked, *Melophagus ovinus*, was then tested, but also with negative results, attempts to feed the flies on *Moniezia* eggs proving a failure.

Helm (—). **Beitrag zum Anaplasmen-Problem.** [A Contribution to the Problem of Anaplasmosis.]—*Zeitschr. f. Infektionskrankh., parasit. Krankh. u. Hyg. d. Haust.*, xxv, no. 4, pp. 199–226. Berlin, February 1924. (Abstract in *Trop. Vet. Bull.*, xii, no. 2, pp. 50–51. London, 31st May 1924.)

In an experiment with ticks, *Ixodes ricinus*, it was found that larvae derived from females engorged on cattle imported into Germany from Texas and infected with anaplasmosis were capable of transmitting the infection. The period elapsing between the placing of the larvae on the animal and the appearance of anaplasms in its blood was two months [*cf. R.A.E.*, B, xi, 207].

Doeve (W. C. A.). **De teek op Celebes.** [The Tick in Celebes.]—*Nederl.-Ind. Bladen Diergeneesk. en Dierenteelt*, xxxiv, pp. 4–18, 5 figs. Buitenzorg, 1923. (Abstract in *Centralbl. Bakt. Paras. Infekt.*, IIte Abt., lxii, no. 17–23, p. 540. Jena, 6th October 1924.)

A full description is given of *Boophilus annulatus*, which is common and injurious on horses in Celebes, but rare on cattle and buffalos.

Wirth (P. H.). **Over arsenikhoudende dipvloeistoffen.** [On Dips containing Arsenic.] — *Nederl.-Ind. Bladen Diergeneesk. en Dierenteelt*, xxxv, no. 2, pp. 20–28. Buitenzorg, n.d.

With a view to reducing the cost of dipping, a local Javanese product containing arsenic (arsenious oxide, $As_2 O_3$) was used for preparing an alkaline sodium arsenite standard fluid with a 60 per cent. content of $As_2 O_3$ and which by diluting 1 : 250 contains 0·24 per cent. $As_2 O_3$.

A study of the conditions that give rise to deterioration in the arsenical content of dips shows that faecal pollution reduces it to practically nil within a month or a little longer, and that this is not prevented by adding 0·01—0·05 per cent. of creoline or by covering the surface with oil. The deterioration is favoured by an alkaline reaction.

Experiments were made to ascertain the causes that decrease the active component in a dip, and to find a manner of preventing such decrease. Three standard solutions were prepared, one with the commercial sodium arsenite used for dips, one with the home-made

sodium arsenite, and one with a solution of sodium arsenite to which enough sulphuric acid was added to make it barely alkaline to dimethyl yellow. This last solution contained free $As_2 O_3$ and sodium sulphate. The results of the experiments are given.

The conclusions drawn as regards practical work with dipping fluids are as follows : It is important to contaminate the dip as little as possible. The content of $As_2 O_3$ diminishes rapidly in a fluid polluted with faecal matter. The greater the alkalinity of the fluid, the speedier the decrease. The addition of creoline does not influence the variations in the content of $As_2 O_3$. In an alkaline standard solution a film of petroleum did not prevent the decrease of $As_2 O_3$. Where faecal pollution was present, the solution containing free $As_2 O_3$ and with the addition of 0·05 per cent. creoline and a covering of petroleum was the only one that remained stable. This is the only solution advisable for practical use.

If therapeutical reasons render an alkaline reaction desirable, the animals should be given a preliminary bath in alkaline soap solution, which will also limit the pollution of the dip. Alternatively the dip may be rendered alkaline just before use and acidified for keeping.

MANRESA (M.). **Note on** *Dioscorea hispida,* **Dennst., as a Cure for Myiasis.**—*Philippine Agriculturist,* xiii, no. 5, pp. 213–214. Los Baños, October 1924.

Dioscorea hispida is a tuberous vine, very common in the Philippines, where it thrives without care and produces a root of enormous size. The root has well-known toxic properties, and though when properly prepared it can be used as a farinaceous food, a more important use is for killing maggots infesting wounds in animals. The method is to peel a large root and cut it into thin slices, which are ground in a mortar. When the mass has reached the consistency of a paste, it is ready for application to the wound, either alone or in combination with coconut oil and some leaves, such as tobacco, or with the fruit of the chilli pepper (*Capsicum frutescens*), and sometimes in combination with lime. In view of the wide distribution of the plant in the Philippines and of its apparent efficacy in the treatment of myiasis, which so frequently affects animals on stock farms, the subject is thought of sufficient importance to warrant a series of experiments for the purpose of determining the value of the tuber. A better means of applying the remedy might also be devised.

ROSS (W. A.) & CAESAR (L.). **Insects of the Season.**—*54th Ann. Rept. Ent. Soc. Ontario, 1923,* p. 63. Toronto, 1924.

Pests of cattle recorded during 1923 were *Lyperosia* (*Haematobia*) *irritans* (horn fly), which seemed to be exceptionally abundant, and *Hypoderma bovis,* which caused more trouble than in the previous year.

WICKWARE (A. R.). **Notes on Lice with special Reference to the Chicken Louse** (*Lipeurus heterographus*).—*54th Ann. Rept. Ent. Soc. Ontario, 1923,* pp. 67–71. Toronto, 1924.

In view of the known relations between lice and man in the conveyance of infectious diseases, it is reasonable to expect that some connection may be found between many of the infectious diseases of domestic animals and the lice parasitic upon them. Whether such parasites are capable of causing the death of animals by irritation,

without the intervention of any contagious disease, is problematical. From lengthy experiments in feeding large numbers of lice on man, the conclusion has been reached that the clothes louse, *Pediculus humanus* (*vestimenti*), if present in large numbers, may produce an illness, which appears to be an intoxication of the system, with some toxin that it introduces at the time of feeding. It is also probable that some of the symptoms of trench fever encountered in certain cases may not be due to the organism of trench fever but to certain toxins introduced by the lice.

Owing to the general belief among poultrymen that the chicken head louse, *Lipeurus heterographus*, is responsible for heavy mortality among young chickens, experiments were undertaken during 1922 to determine whether this is the case. The results of the experiments show little reason for the belief, though parasitism of any nature or degree must be considered in relation to susceptibility to disease, and undoubtedly lowered resistance due to heavy infestation tends to a fatal issue. Frequently, however, heavy infestation is an index of lowered resistance from debility and faulty metabolism, or, in the case of fowls, from confinement, overcrowding, and a withdrawal of the natural means of defence, and in these cases the presence of parasites may be regarded as the result and not the cause of impaired vitality.

Maggiora (A.) & Tombolato (A.). **Osservazioni sul tifo essudativo dei gallinacei o peste aviaria.** [Observations on the Exudative Typhus of Poultry or Avian Plague.]—*Rend. R. Accad. Sci. Ist. Bologna*, Classe Sci. fis., xxvii, pp. 200–203. Bologna, 1923.

The chicken louse, *Goniodes dissimilis*, is considered, contrary to the reports of other observers, a dangerous reservoir of the virus of poultry typhus. An emulsion prepared from a louse taken from an infested bird killed a healthy bird within 40–42 hours of inoculation. Lice, taken from an infected bird and containing blood in the digestive tract, retained their virulence for several days. The placing of infected lice on a healthy bird did not lead to infection, but the new host may injure itself by scratching and thus afford an entry to the virus.

Although poultry lice are commonly considered not to be blood-suckers, the large numbers that contain blood in the digestive tract while the skin of their hosts does not constantly show lesions cause the doubt to arise whether the lice have obtained the blood from the skin or whether they can suck blood directly. New research is desirable on this point.

The disease is transmitted to a variety of birds, including sparrows, quails, pheasants, geese, fowls, etc.

Graham (R.) & Boughton (I. B.). *Clostridium botulinum* **Type C. A Pathogenic Anaerobe associated with a Limberneck-like Disease in Chickens and Ducks.**—*Illinois Agric. Expt. Sta.*, Bull. 246, 34 pp., 9 figs. Urbana, Ill., October 1923. [Received 16th October 1924.]

The symptoms of a disease of chickens and ducks are described. The examination of the intestinal contents and internal organs of affected chickens suggest that one type of the avian botulism syndrome is closely associated with the ingestion of a bacterial toxin related to, if not identical with, the toxin isolated from the larvae of *Lucilia caesar* by Bengston [*R. A.E.*, B, x, 110; xi, 89]. The different types of botulinus poisoning are discussed.

HENRY (—) & LEBLOIS (—). **Perforation de la plume d'origine parasitaire chez le pigeon.**—*Rev. vét.*, lxxvi, no. 10, pp. 640–641. Toulouse, October 1924.

Injury in the form of small perforations to the wing and tail feathers of carrier pigeons has been found to be due to the mite, *Falculifer rostratus*. These mites are lodged along the quill. They were successfully exterminated by fumigation with sulphurous anhydride. Two applications were made of 20 minutes each at an interval of 8 days. The pigeon house was disinfected by burning sulphur. Since the first moult after this treatment no defective feathers have been found.

CAMPBELL (J. G. C.). **The Stickfast Flea.**—*W. Australia Dept. Agric.*, Bull. 104, 16 pp., 8 figs. Perth, 1923.

An account is given of the various stages of *Echidnophaga gallinacea*, Westw. (stickfast flea), its habits and distribution and methods of control. The latter include general hygiene and the application of oil to the fowls. A non-irritating oil, such as castor or olive oil, should be liberally applied to the infested parts with a rag. It is also recommended that a tray should be fixed beneath the perches that would collect the droppings as well as the eggs of the parasite. These trays should be cleaned once a week and treated with strong carbolic acid ; and the droppings should be collected in a bucket and kept covered with water for a week, after which any eggs present will have been destroyed, and the manure may be used in the garden.

ALLMAN (G.). **Automatic Device for Eradication of Stickfast Flea.**—*W. Australia Dept. Agric.*, Leaflet 112, 3 pp., 3 figs. Perth, 1923.

A type of feed hopper, designed by M. O'Brien, is described, the object of which is to do away with the necessity of treating each bird with oil individually. By an arrangement of rollers, an oil container and strips of flannel, the fowls are automatically treated with the oil as they feed. Details for making the apparatus are given.

EDWARDS (F. W.). **New Species of Nematocerous Diptera from Fiji and Trinidad.**—*Ann. & Mag. Nat. Hist.*, xiv, no. 83, pp. 568–574. London, November 1924.

The new species described include *Simulium laciniatum* from Fiji.

LEON (N.). **L'armature bucale et la pompe salivaire des** *Culicoides pulicaris.*—*Bull. Sect. Sci. Acad. Roumaine*, ix, no. 1–2, pp. 17–22, 3 figs., 1 pl. Bucarest, 1924.

The structure of the buccal armature in *Culicoides pulicaris* is described, and the existence of the salivary pump is demonstrated.

VERGE (J.). **Les spirochétoses animales.**—*Agron. colon.*, no. 82, pp. 103–112. Paris, October 1924.

The spirochaetes found in domestic animals are described, together with the clinical symptoms resulting from infection. Brief reference is made to records of ticks as vectors.

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